CORRADINO

Knoxville Area Transit (KAT)

Transit Development Plan

Downtown Transit Plan

Submitted to:

Knoxville Area Transit
and Knoxville Knox County
Metropolitan Planning Commission

Submitted by:

Connetics Transportation Group

Under contract to:

The Corradino Group, Inc.

October 2009

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1. Introduction

The Downtown Transit Plan is an important and fairly unique element of the KAT Transit Development Plan (TDP). KAT recognized even before beginning a full TPD effort that a downtown trolley study and bus routing analysis is needed to support the impending opening in 2010 of a new downtown transfer point, Knoxville Station. This report presents a Downtown Transit Plan that focuses on both the local/express fixed route bus service and trolley route configurations. Conceived as a stand-alone document from the TDP, it focuses on KAT's existing route structure. It does not attempt to incorporate modifications to local and/or express routes outside the downtown area that are being contemplated as part of the TDP. This plan was developed in a period of change for KAT and the recommendations herein will likely be modified during the final scheduling of the routes.

Section 2 of the report evaluates the current trolley routes operated by KAT, based on the results of the TDP survey efforts. This section gives an overview of the trolley system and presents detailed route profiles for each of the four trolley routes. Section 3 presents an evaluation of the existing downtown local and express bus operations. It summarizes the primary local route patterns used by KAT's local routes today to serve the existing downtown transfer point on Main Street, as well as existing express route patterns downtown.

Section 4 of the report describes the development of Knoxville Station access/egress options. These options were developed based on existing and possible future route access/egress patterns to the new Knoxville Station. Since the station is currently under construction and its design has been finalized, access/egress options that required physical changes to the existing design were not considered. Several options for local route configurations, as presented to KAT and TPO staff in December 2008, as well as a preferred alternative, are presented. New express route configurations are also identified. All local bus routes serving Knoxville Station were analyzed for schedule travel time impacts to determine optimal route interline combinations. Recommendations are made to modify route interline pairs so as to present a plan that would not result in additional buses or operating cost increases for the local routes. The plan continues to assume the use of pulse scheduling, utilizing 15 minute interval departures as currently in operation.

Section 5 of the report provides recommendations for modifying the trolley route system to support the opening of Knoxville Station and increase their effectiveness as downtown circulators. A frequent request of the public and stakeholders has been to re-design the trolley system as a series of linear routes, and was a key consideration during route planning. The extent to which trolley routes can be made linear in downtown Knoxville, however, is severely limited by one-way streets, narrow streets, limited turning radii, and the design of Knoxville Station with the trolley stop (requiring trolleys to travel westbound on Church Avenue).

Other planning considerations included 1) operating the trolley system without requiring additional vehicles (i.e., no more than eight required for maximum service), 2) establishing frequencies supporting timed transfers between local and trolley routes, 3) serving key origins and destinations, and 4) providing some level of trolley service between downtown and Knoxville Station until 12:15 a.m. when local service ends. The recommendations meet the goal of requiring no additional vehicles and would require only a modest increase in annual revenue-hours and operating costs.

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2. Existing Trolley Operations

This chapter presents a brief description of the existing trolley routes operated in KAT serving downtown Knoxville and the University of Tennessee (UT) area, followed by individual route profiles presenting a detailed assessment of each.

2.1 Overview of Trolley Routes

The downtown Knoxville trolley system has been in place since 1986 and has grown to serve downtown Knoxville, UT, the Fort Sanders neighborhood, and UT's off-campus student housing. Travel patterns have changed immensely over these past 20 years. Trolley service has been incrementally modified over this time period in response to these changing travel patterns.

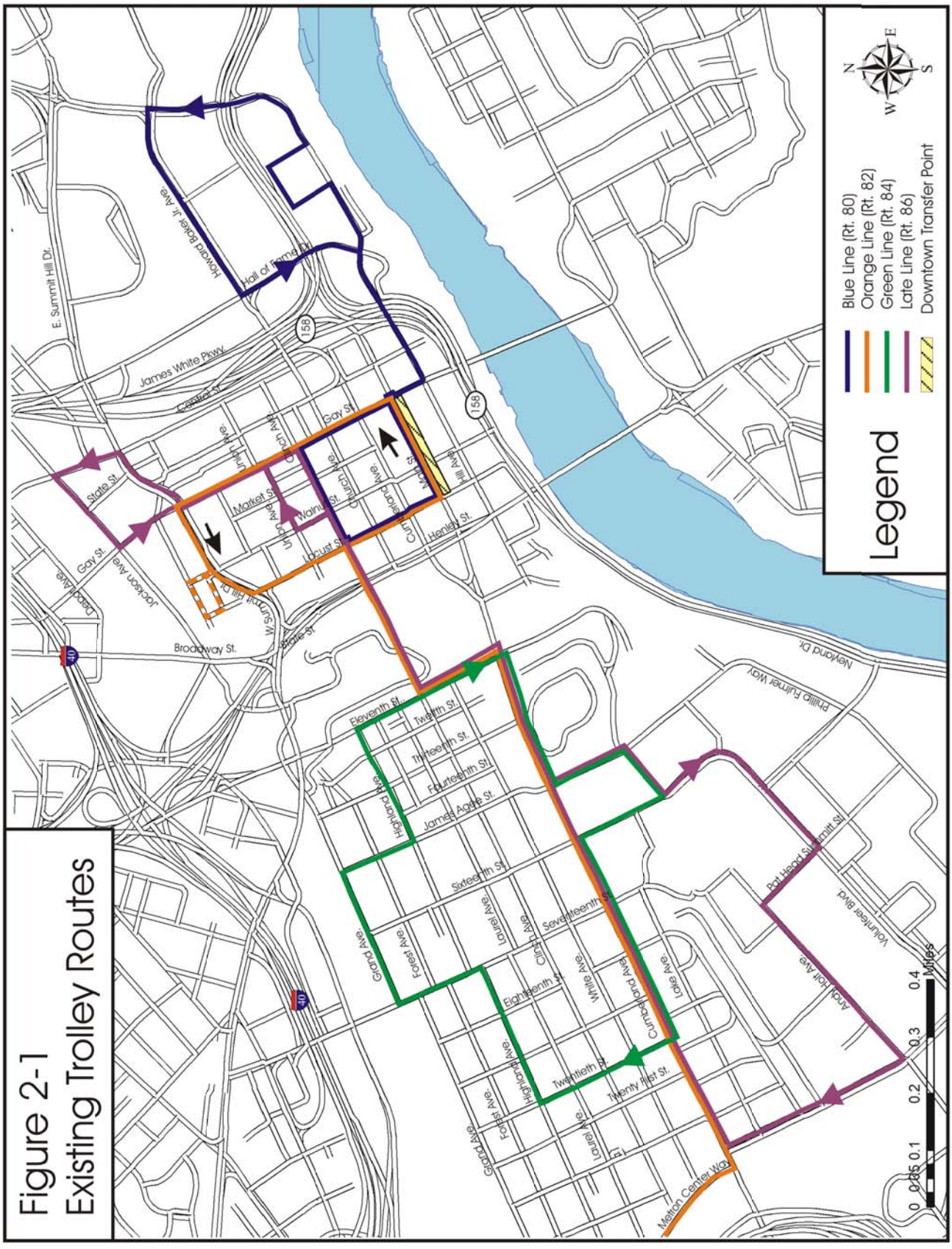
KAT's trolley system serves a changing and different market from the local and express routes in the system. In the morning and afternoon peak periods, trolleys are used to help downtown workers get from where they park, such as at the Coliseum Parking Garage, or from another route ending at the Downtown Transfer Point, to their work destinations. Downtown residents, such as people living in Summit Towers and apartments and condominiums, use the trolleys as they would any other bus route to get to work or shopping or to access other routes at the Downtown Transfer Point. During the midday, trolleys are used for quick trips to lunch or on personal errands. Throughout the day, trolleys may be used by visitors to get to tourist destinations or convention facilities. UT students, faculty, and staff also make use of the trolleys to travel between UT and Fort Sanders, downtown UT facilities, and downtown entertainment venues.

KAT's trolley system currently consists of four routes, as shown in Figure 2-1. Each of these routes is briefly described below.

- **Route 80 - Blue Line:** This trolley route operates from the Coliseum Parking Garage and connects the core of downtown south of Clinch Avenue, including the Downtown Transfer Point, and the attractions surrounding the Knoxville Civic Coliseum. It operates year-round on weekdays.

- **Route 82 - Orange Line:** This trolley route operates from the Downtown Transfer Point and connects downtown and the UT area along Cumberland Avenue. It operates year-round on weekdays.

- **Route 84 - Green Line:** This trolley route operates from UT's student center and connects the UT campus, the Cumberland Avenue Strip, and the off-campus housing and hospital in the Fort Sanders neighborhood. This route operates on weekdays during UT's Fall and Spring Semesters.


Legend
Blue Line (Rt. 80)
Orange Line (Rt. 82)
Green Line (Rt. 84)
Late Line (Rt. 86)
Downtown Transfer Point
N
E
S
W
0 0.05 0.1 0.2 0.3 0.4 Miles
Figure 2-1
Existing Trolley Routes
James White Pkwy.
Howard Baker Jr. Ave
Hall of Fame Dr.
E. Summit Hill Dr.
Central St.
Gay St.
State St.
Broadway St.
Jackson Ave
Locust St.
Walnut St.
Market St.
Church Ave
Union Ave
Cumberland Ave
Henley St.
Neyland Dr.
Phillip Fulmer Way
Volunteer Blvd
Andy Holt Ave
Pat Head Summitt St
Lake Ave
Melton Center Way
Grand Ave
Forest Ave
Laurel Ave
Highland Ave
James Agee St.
Eleventh St.
Twelfth St.
Thirteenth St.
Fourteenth St.
Sixteenth St.
Seventeenth St.
Eighteenth St.
Twentieth St.
Twenty First St.
Cumberland Ave
158
40

- **Route 86 - Late Line:** This trolley route operates from the Historic Old City District and connects the restaurants and entertainment venues in downtown and along the Cumberland Avenue Strip and UT campus housing. This route operates on Friday and Saturday nights during UT's Fall and Spring Semesters.

2.2 Individual Trolley Route Profiles

The following pages present detailed assessments of route characteristics and historical and current ridership. Each route profile presents the following information:

- A "snapshot" of route service characteristics and service productivity measures;
- A description of the existing route alignment;
- Historical ridership for a 12-month period; and,
- Current ridership and maximum vehicle loads as determined from the ridecheck survey.

Various graphs and maps within each route profile present historical ridership activity, current ridership activity (boardings and alightings) at the segment level and by time of day, and data indicating how crowded the trolleys in each time period.

Route 80 - Blue Line Trolley

The Blue Line operates from the Coliseum Parking Garage and provides service to two loops. The first serves attractions surrounding the Knoxville Civic Coliseum on the east side of the James White Parkway. The second serves the core of downtown south of Clinch Street. This route operates year-round on weekdays.

Transit Centers

Downtown Transfer Point

Major Destinations

Coliseum Parking Garage
Knoxville Civic Coliseum
James White Fort
Riverview and Plaza Towers
Bijou Theatre
Tennessee Theatre
Locust Street Parking Garage
Hilton Hotel
UT Conference Center
Federal, City, and County Buildings
Blount Mansion
Women's Basketball Hall of Fame
Marriott Hotel

Current Operations & Service Requirements (October 2008)

	Weekday
Hours of Operation:	5:50 a.m. - 6:25 p.m.
Frequency (min):	5 peak/10 off-peak
Cycle Time (min):	15 peak/20 off-peak
Layover Time (min):	none indicated

Route 80 is not interlined with any other route.

Daily Round Trips:	106
Daily Rev-Hours:	29.9
Daily Rev-Miles:	291.2
Buses Required:	3 peak/2 off-peak

Route Service Productivity

	Weekday
Avg. Daily Boardings:	636
Pass./Rev. Veh.-Hr:	21.3
Pass./Rev. Veh.-Mi:	2.2
Pass./Trip:	6.0

Description of Existing Alignment

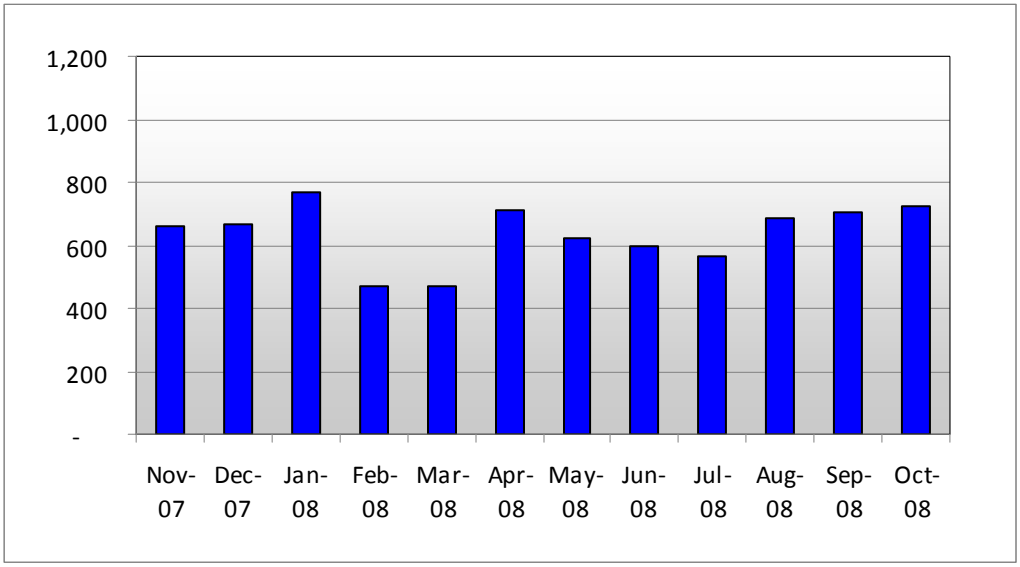
The Blue Line operates from the Knoxville Civic Coliseum and Coliseum Parking Garage east of the James White Parkway to the core of downtown via Howard Baker Avenue, Hall of Fame Drive, and East Hill Avenue. In the downtown core, it operates in a counter-clockwise loop, traveling north on Gay Street, west on Clinch Avenue, south on Locust Street, and east on Main Street to the Downtown Transfer Point. Along this loop, the route serves several major office high-rises, government buildings, hotels, and parking garages, as well as tourist destinations primarily along Gay Street and the UT Conference Center.

After leaving the Downtown Transfer Point, the route returns to the Knoxville Civic Coliseum and Coliseum Parking Garage via Gay Street and East Hill Avenue, completing the counter-clockwise loop east of the James White Parkway along East Hill Avenue and Howard Baker Avenue, with a small deviation serving the Marriott Hotel and Women's Basketball Hall of Fame.

Historical Ridership Characteristics

Average daily ridership by month from November 2007 to October 2008 is presented in the figure below. Blue Line ridership does not appear to be reliant on UT riders.

Route 80 - Blue Line Trolley
Average Daily Ridership Levels by Month
(November 2007 to October 2008)



Current Ridership Characteristics (January 2009)

A ridecheck survey was completed on January 14 and January 29, 2009. The following survey results are presented below:

- A graph showing ridership activity (boardings and alightings) and the number of trips per hour provided by time of day;
- A chart that presents maximum vehicle loads and corresponding load factors by time period; and,
- A map with graphics that illustrates total boarding and alighting activity by segment.

Ridecheck Survey Observations

- Ridership activity is highest in the 7:00 a.m. and 4:00 p.m. peak hours. While ridership is lowest prior to the 7:00 a.m. hour and after the 5:00 p.m. hour, these trips provide an important safety net for regular riders on the route who may need it in emergency situations. This is consistent with a ridership pattern of use primarily by downtown workers riding the trolley from the Coliseum Parking Garage to their place of work downtown and back again in the afternoon.

- Ridership activity remains fairly strong and constant in the midday hours. The apparent dip in ridership during the noon hour is at least partly attributable to two trips (out of six) that were not surveyed. Boarding and alighting data at the segment level by time of day indicates use of the trolley in the midday to circulate through downtown.

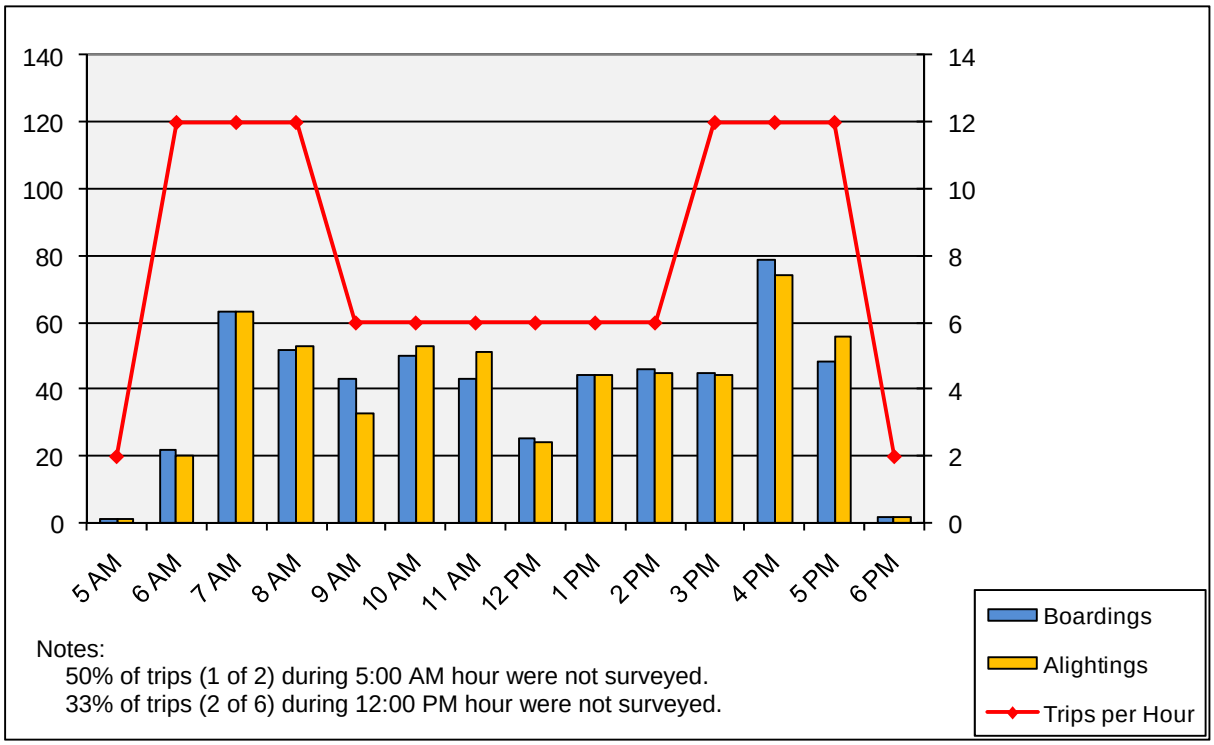
- Ridership at the stop level is highest at the Coliseum Parking Garage and the KAT Transfer Point. It is important to note that both of these stops also serve downtown destinations (the Civic Coliseum and government buildings on Main Street). Other relatively high activity is concentrated in the central core of downtown, particularly along Gay Street. The lowest ridership occurs at the stops on Hill Avenue.

- The number of trips per hour appears to correspond relatively well with boardings and alightings, with the exception of the 6:00 a.m. hour. It appears that frequencies could be reduced from until 7:00 a.m.

- A detailed evaluation of trip-level ridecheck data reveals insufficient run-times during the peak periods. Allotted run-times during the peak periods are 15 minutes, whereas midday run-times are 20 minutes. Observed run-times in the peak periods were approximately 20 minutes. As a result, the trolleys were unable to complete all their scheduled trips between 7:00 and 8:30 a.m. and between 4:30 and 6:00 p.m. Ride checkers noted trips that were skipped in order to get back on schedule and space out the vehicles.

- The maximum number of riders on-board during any one trip was highest in the afternoon peak period, with 17 riders during the 5:00 p.m. hour. At no time were the trolleys more than about half full, and loads were especially low before 7:00 a.m. and after 6:00 p.m.

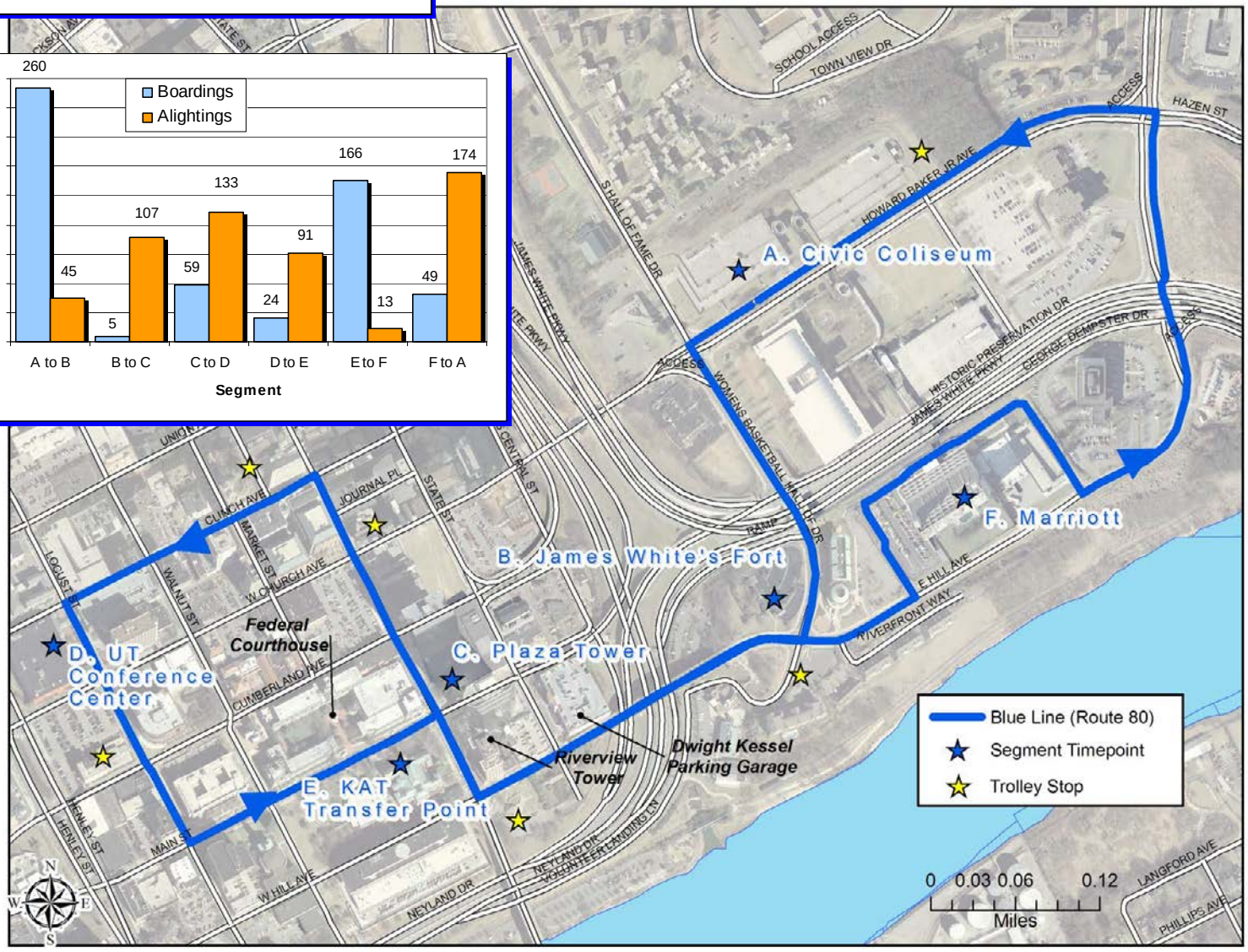
Route 80 - Blue Line Trolley
Ridership and Trips Provided by Time of Day



Route 80 - Blue Line Trolley
Maximum Vehicle Loads/Load Factors by Time Period

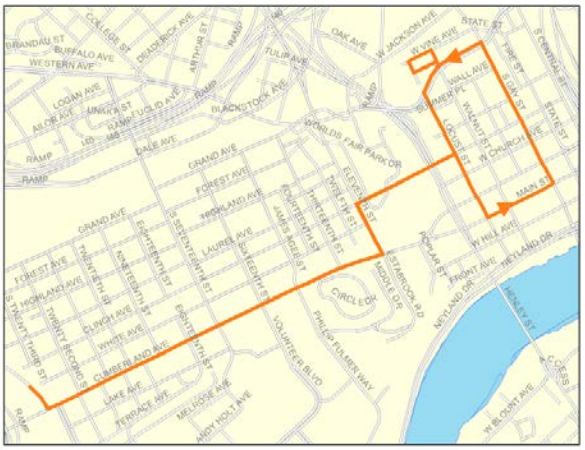
Time Period		Weekday	
		Max Load	Load Factor
Early	5:30 a.m. - 7:00 a.m.	4	0.13
AM Peak	7:00 a.m. - 9:00 a.m.	13	0.43
Midday	9:00 a.m. - 3:00 p.m.	13	0.43
PM Peak	3:00 p.m. - 6:00 p.m.	17	0.57
Evening	6:00 p.m. - 6:30 p.m.	2	0.07

Route 80 – Blue Line



Route 82 - Orange Line Trolley

The Orange Line operates from the Downtown Transfer Point and provides service to downtown and to UT along the Cumberland Avenue Strip. The route operates along a counter-clockwise loop around the core of downtown. It continues on Clinch Avenue, 11th Street and Cumberland Avenue west to UT Metron Center. On its return, it completes the downtown loop, ending at the Downtown Transfer Point. This route operates year-round on weekdays.



Transit Centers

Downtown Transfer Point

Major Destinations

Federal, City, and County Buildings
Riverview and Plaza Towers
Bijou Theatre
Tennessee Theatre
TVA Towers
Crowne Plaza Hotel
Summit Towers (select trips)
Summer Place
Locust Street Parking Garage
Hilton Hotel
UT Conference Center
Knoxville Convention Center
The Hill (Ayers Hall, etc.)
Hoskins Library
Law Library
University Center
Cumberland Avenue/UT Strip
UT Metron Center

Current Operations & Service Requirements (October 2008)

	Weekday
Hours of Operation:	6:33 a.m. - 6:49 p.m.
Frequency (min):	8
Cycle Time (min):	32
Layover Time (min):	none indicated

Route 82 is not interlined with any other route.

Daily Round Trips:	89
Daily Rev-Hours:	47.6
Daily Rev-Miles:	391.9
Buses Required:	4

Route Service Productivity

	Weekday
Avg. Daily Boardings:	955
Pass./Rev. Veh.-Hr:	20.1
Pass./Rev. Veh.-Mi:	2.4
Pass./Trip:	10.7

Description of Existing Alignment

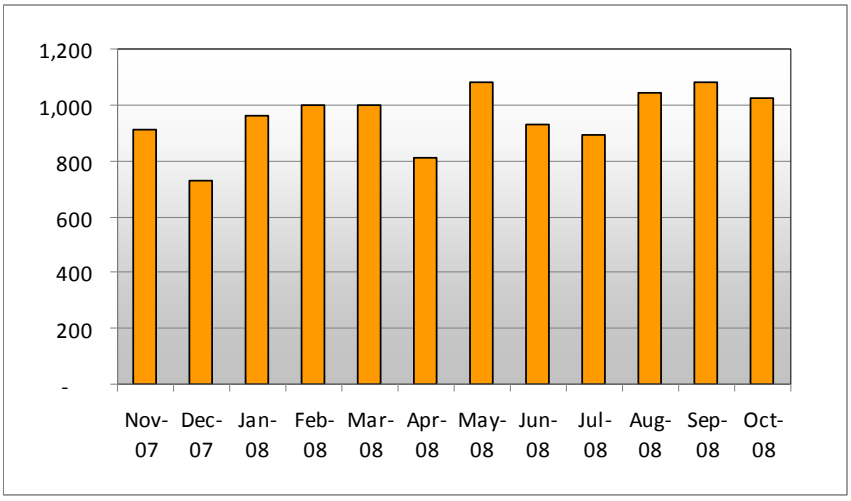
The Orange Line Trolley operates from the Downtown Transfer Point in a counter-clockwise loop around the downtown core and also serves UT along the Cumberland Avenue Strip. From the Downtown Transfer Point, it travels east on Main Street, north on Gay Street, west on Summit Hill Drive, and south on Locust Street to Clinch Avenue. Along this portion of the loop, the route serves the Riverview, Plaza, and TVA office towers, tourist destinations along Gay Street, Market Square, and Crowne Plaza Hotel. From 9:00 a.m. to 4:00 p.m., the route makes a small deviation from Summit Hill Drive to serve Summit Towers (senior and disabled housing).

The route leaves downtown west on Clinch Avenue and south on 11th Street through the World's Fair Park, serving the UT Conference Center, Holiday Inn Select, Knoxville Conference Center, and the Candy Factory. The Orange Line Trolley turns west on Cumberland Avenue to serve the UT campus (the Hill, Hoskins Library, Law Library, and University Center) and "The Strip." Immediately west of the railroad underpass, the route turns north to serve the UT Metron Center, where it begins its return trip to downtown. On the return trip, the route completes the downtown loop south on Locust Street and west on Main Street, serving city, county, and federal buildings, and completing its round-trip at the Downtown Transfer Point.

Historical Ridership Characteristics

Average daily ridership by month from November 2007 to October 2008 is presented in the figure below. Orange Line ridership does not appear to be heavily reliant on UT riders, although ridership during Fall and Spring Semesters is slightly higher (6%) than the summer months.

Route 82 – Orange Line Trolley
Average Daily Ridership Levels by Month
(November 2007 to October 2008)



Current Ridership Characteristics (September - October 2008)

A ridecheck survey was completed on September 9 and October 18, 2008, during UT's Fall semester. The following survey results are presented below:

- A graph showing ridership activity (boardings and alightings) and the number of trips per hour provided by time of day;
- A chart that presents maximum vehicle loads and corresponding load factors by time period; and,
- A map with graphics that illustrates total boarding and alighting activity by segment.

Ridecheck Survey Observations

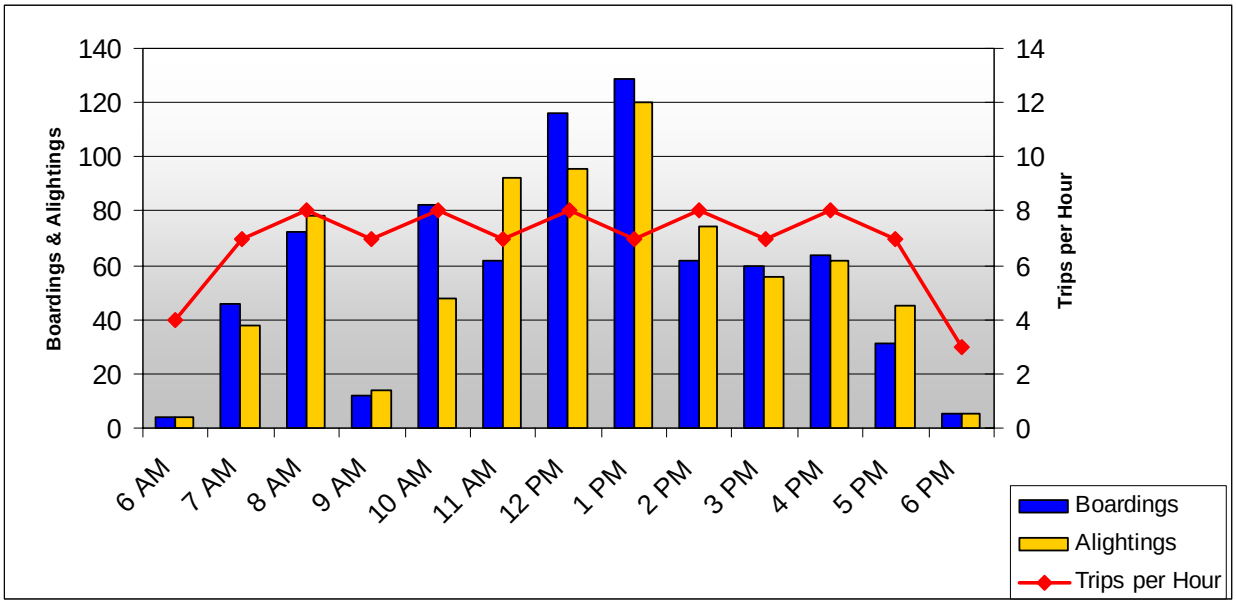
- Most of the ridership on the Orange Line occurs between 10:00 a.m. and 2:00 p.m. hours, reflecting an inverse peak pattern associated with UT. This is also shown in the total segment boardings, where 80 percent of the boardings and 84 percent of the alighting occurred along the segments between UT and downtown Knoxville.

- The Orange Line also demonstrates increased peak hour activity at 8:00 a.m., which may be associated with regular peak ridership activity in downtown Knoxville.

- Ridership by hour may reflect a mix of ridership, including downtown workers, UT students and personnel, and tourists. Downtown workers could be expected to travel to/from parking to their place of employment during A.M. and P.M. peak periods, as well as around downtown during lunchtime. However, ridership associated with tourism and universities typically demonstrates an inverse peak, with ridership highest in the midday. The number of trips per hour throughout the day on the Orange line is consistent with the peak period activity associated with downtown activity and inverse peak activity associated with UT.

- The maximum number of riders on-board during any one trip was highest in the midday, with 26 riders during the 1:00 p.m. hour, which may reflect people returning from lunch. Otherwise, maximum loads from 7:00 a.m. to 5:00 p.m. tend to remain fairly constant, with an average maximum load of 11 riders.

Route 82- Orange Line Trolley
Ridership and Trips Provided by Time of Day

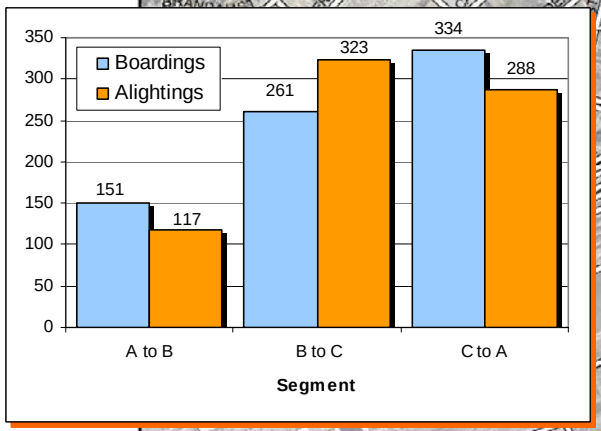


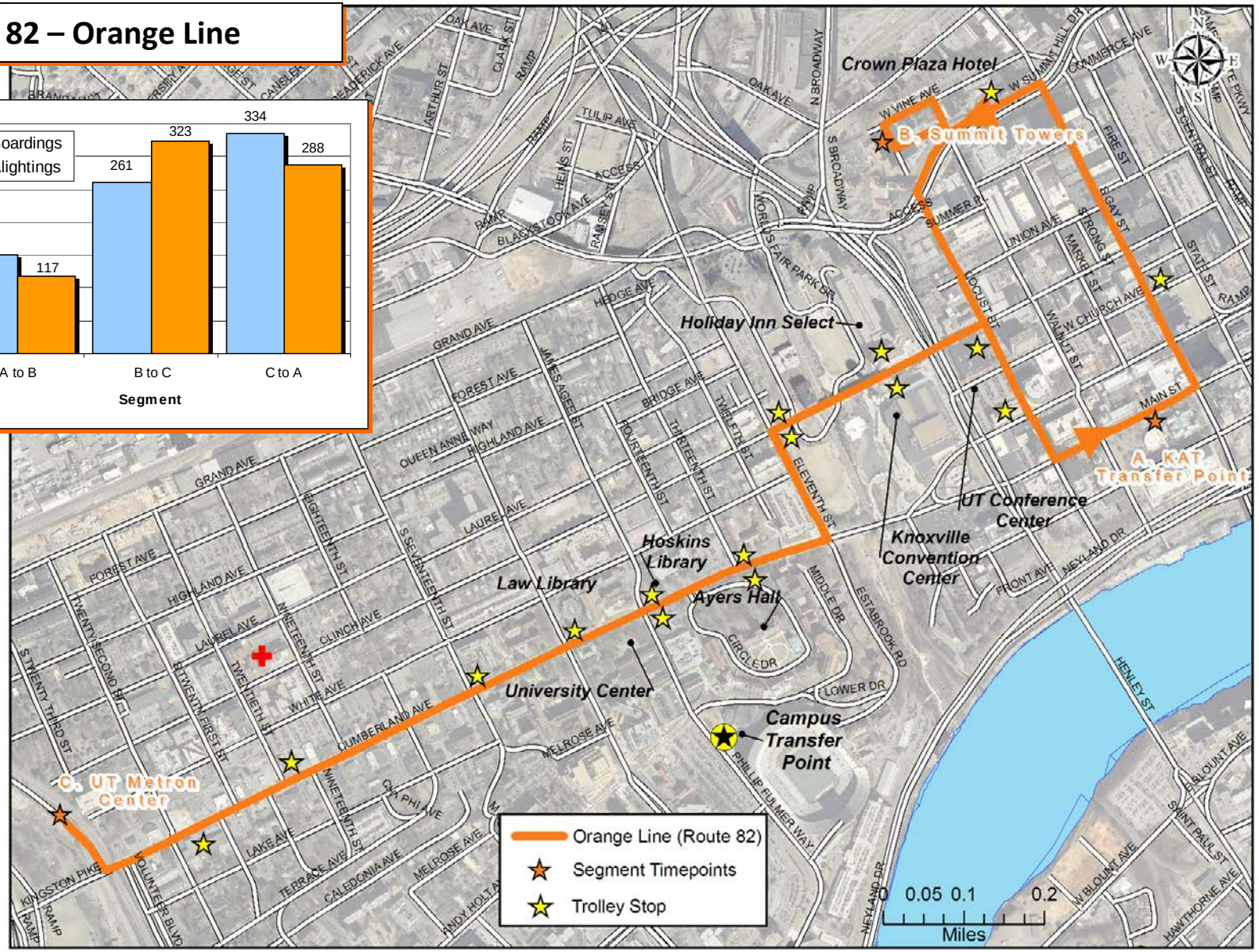
Note: Only 50 percent of the trips on Route 82 were surveyed during the A.M. hours. Ridership was therefore factored up 100 percent to account for this missing data between 6:33 a.m. until 12:17 p.m.

Route 82- Orange Line Trolley
Maximum Vehicle Loads/Load Factors by Time Period

Time Period		Weekday	
		Max Load	Load Factor
Early	6:30 a.m. - 7:00 a.m.	2	0.07
AM Peak	7:00 a.m. - 9:00 a.m.	11	0.37
Midday	9:00 a.m. - 3:00 p.m.	26	0.87
PM Peak	3:00 p.m. - 6:00 p.m.	18	0.60
Evening	6:00 p.m. - 7:00 p.m.	3	0.10

Route 82 – Orange Line





Route 84 – Green Line Trolley

The Green Line operates from UT's student center and provides circulator service along Cumberland Avenue and through the Fort Sanders neighborhood. This route operates on weekdays during UT's Fall and Spring Semesters.

Transit Centers

UT Campus Transfer Point

Major Destinations

University Center
Cumberland Avenue/UT Strip
Fort Sanders Hospital
The Commons Apartments
Grand Forest Apartments
The Arts District
World's Fair Park
The Hill (Ayers Hall, etc.)
Hoskins Library
Law Library

Current Operations & Service Requirements (October 2008)

	Weekday
Hours of Operation:	7:00 a.m. - 6:00 p.m.
Frequency (min):	20
Cycle Time (min):	20
Layover Time (min):	none indicated

Route 84 is not interlined with any other route.

Daily Round Trips:	33
Daily Rev-Hours:	11.0
Daily Rev-Miles:	87.5
Buses Required:	1

Route Service Productivity

	Weekday
Avg. Daily Boardings:	81
Pass./Rev. Veh.-Hr:	7.4
Pass./Rev. Veh.-Mi:	0.9
Pass./Trip:	2.5

Description of Existing Alignment

The Green Line operates in a clockwise loop, primarily serving the UT campus, the Cumberland Avenue/UT Strip, Fort Sanders Hospital and several off-campus apartment complexes (The Commons and Grand Forest) in the Fort Sanders neighborhood. The route is operated through an operating cost subsidy provided by The Commons apartments.

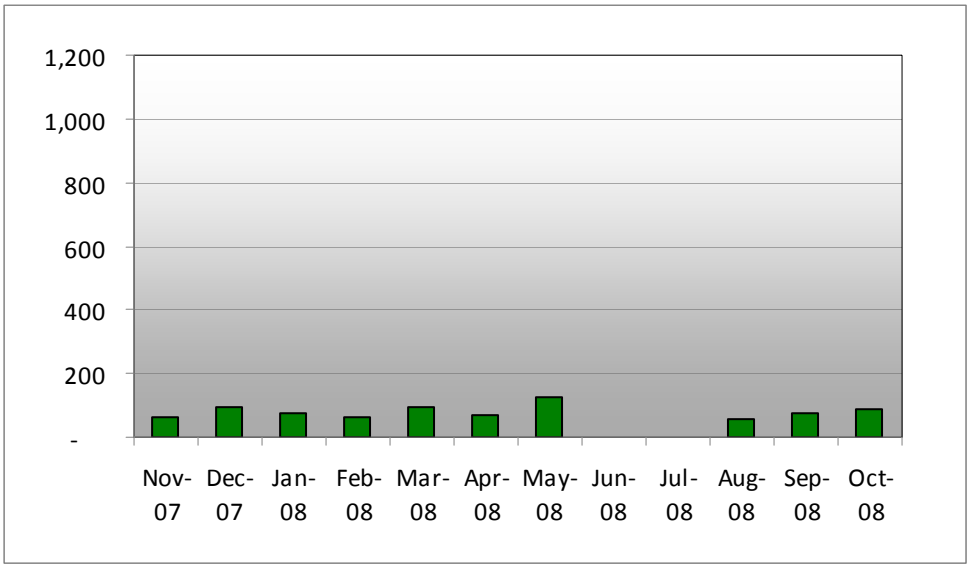
It begins at UT's University Center on Phillip Fulmer Way where it meets with many of The T routes and UT Area KAT routes near the Campus Transfer Point. The route exits the UT campus via Andy Holt Avenue and Volunteer Boulevard, turning west on Cumberland Avenue, with stops along "The Strip," before turning north on 20th Street into the Fort Sanders neighborhood, with a stop at Fort Sanders Hospital.

Turning east, it operates via Highland Avenue, 17th Street, Grand Avenue, and James Agee Street, with several stops at off-campus apartment buildings. The Green Route then turns south on 11th Avenue, serving apartments, the Arts District, and World's Fair Park. It turns west on Cumberland Avenue, serving several UT campus buildings, and returns to the University Center on Phillip Fulmer Way.

Historical Ridership Characteristics

Average daily ridership by month from November 2007 to October 2008 is presented in the figure below. This route operates during UT's Fall and Spring semesters (August through May). During the Break Schedule for the UT campus transit (The T) system, the Green Line does not operate. It therefore operates only part of the month in May, August, December, and January. Green Line ridership is thus assumed to be almost totally reliant on UT riders.

Route 84 – Green Line Trolley
Average Daily Ridership Levels by Month
(November 2007 to October 2008)



Current Ridership Characteristics (October 2008)

A ridecheck survey was completed on October 8 and 17, 2008, during UT's Fall semester. The following survey results are presented below:

- A graph showing ridership activity (boardings and alightings) and the number of trips per hour provided by time of day;
- A chart that presents maximum vehicle loads and corresponding load factors by time period; and,
- A map with graphics that illustrates total boarding and alighting activity by segment.

Ridecheck Survey Observations

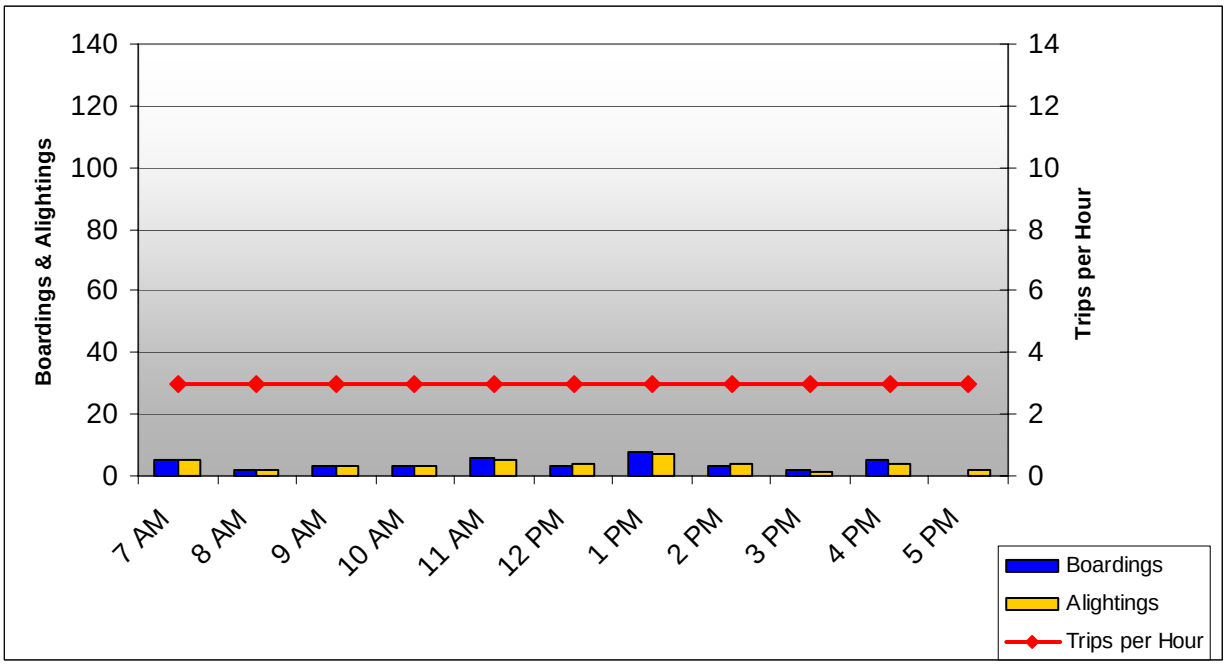
- Hourly ridership Route 84, the Green Line, was greatest during the midday, with the highest activity occurring at 1:00 p.m., which is typical to the inverse peak ridership associated with UT. Ridership activity also increased during the 7:00 a.m. and 4:00 p.m. hours.

- Fifty-five percent of the total boardings along the route occurred between Highland & 11th and the Student Center. Forty-five percent of the alightings occurred between the Student Center and Highlands and 19th.

- The number of trips per hour remains constant throughout the day with three trips per hour.

- When the Green Line Trolley was surveyed, the maximum number of riders on-board during any one trip was only three riders during the 7:00 a.m., 11:00 a.m., and 1:00 p.m. hours. It should be noted that one of the days the route was surveyed was the day before UT's Fall Break, which could have resulted in lower than normal ridership.

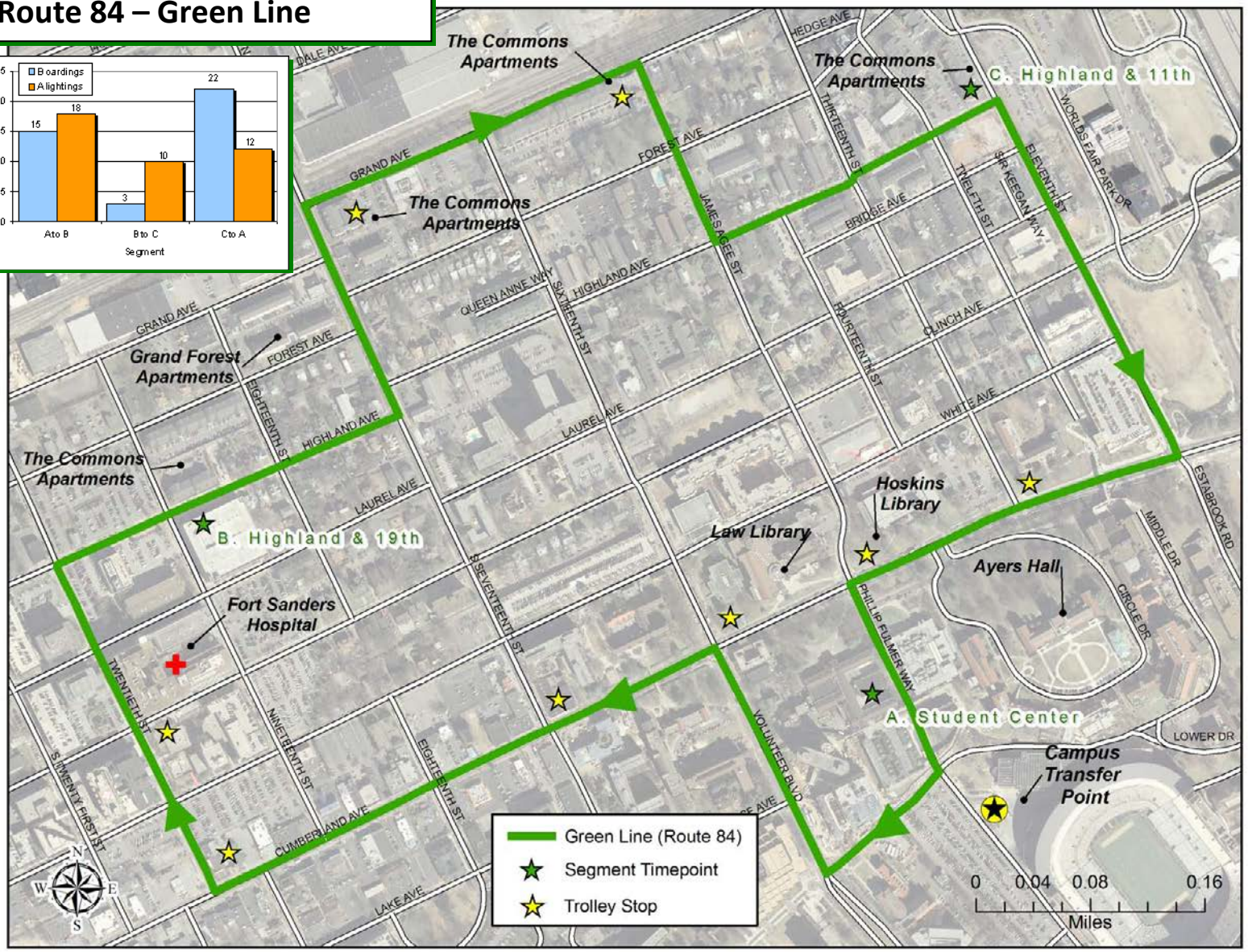
Route 84 – Green Line Trolley
Ridership and Trips Provided by Time of Day



Route 84 – Green Line Trolley
Maximum Vehicle Loads/Load Factors by Time Period

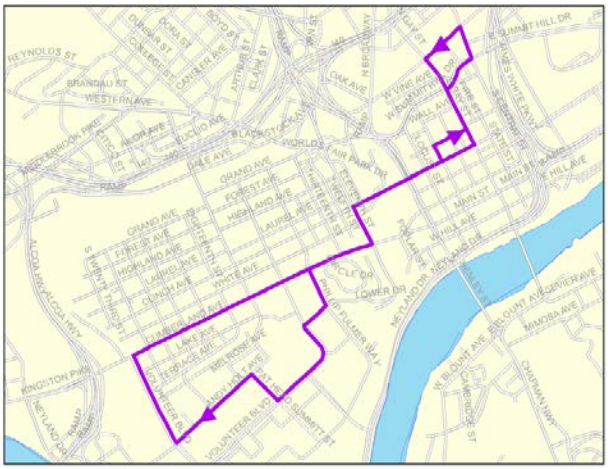
Time Period		Weekday	
		Max Load	Load Factor
AM Peak	7:00 a.m. - 9:00 a.m.	3	0.10
Midday	9:00 a.m. - 3:00 p.m.	3	0.10
PM Peak	3:00 p.m. - 6:00 p.m.	2	0.07
Evening	n/a	n/a	n/a

Route 84 – Green Line



Route 86 – Late Line Trolley

The Late Line Trolley provides service between the Old City and other nighttime attractions in downtown, the UT campus, and the Cumberland Avenue/UT Strip. It operates only on Friday and Saturday evenings during UT's Fall and Spring Semesters. This route provides a safe ride home for UT students on weekends, with service until 3:45 a.m.



Transit Centers

University of Tennessee Transfer Point

Major Destinations

The Old City
Regal Cinemas
Tennessee Theater
Market Square
Knoxville Convention Center
University Center
UT Residence Halls
Cumberland Avenue/UT Strip

Current Operations & Service Requirements (September 2008)

	Friday & Saturday
Hours of Operation:	6:00 p.m. - 3:45 a.m.
Frequency (min):	15
Cycle Time (min):	30
Layover Time (min):	none indicated

Route 86 is not interlined with any other route.

Daily Round Trips:	38.5
Daily Rev-Hours:	19.2
Daily Rev-Miles:	198.9
Buses Required:	2

Route Service Productivity

	Friday & Saturday
Avg. Daily Boardings:	238
Pass./Rev. Veh.-Hr:	12.4
Pass./Rev. Veh.-Mi:	1.2
Pass./Trip:	6.2

Description of Existing Alignment

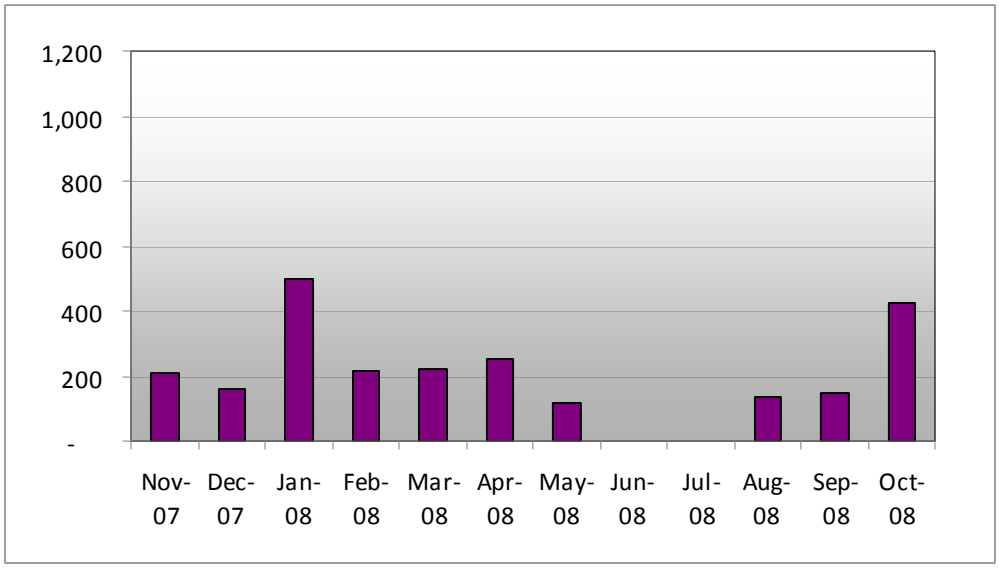
The Late Line operates from the Historic Old City District to the UT campus and Cumberland Avenue. The route starts at Jackson Avenue and Central Street and continues through downtown via Gay Street and Clinch Avenue. In downtown, it serves restaurant and entertainment venues, including Regal Cinemas on Gay Street. The Late Line then makes its way to the UT campus by way of 11th Street and Cumberland Avenue.

It makes a clockwise loop through the UT campus, following Phillip Fulmer Drive, Andy Holt Avenue, Volunteer Boulevard East, Pat Head Summit Street, Andy Holt Avenue, Volunteer Boulevard West, and Cumberland Avenue. On-campus, it serves the University Center, Hodges Library, athletic facilities, and residence halls. It then serves restaurants and entertainment along the Cumberland Avenue/UT Strip before returning to the Old City District via 11th Street, Clinch Avenue, Walnut Street, Union Avenue, Gay Street, Summit Hill Drive, and Central Street.

Historical Ridership Characteristics

Average daily ridership by month from November 2007 to October 2008 is presented in the figure below. This route operates during UT's Fall and Spring Semesters (August through May). During the Break Schedule for the UT campus transit (The T) system, the Late Line does not operate. It therefore operates only part of the month in May, August, December, and January. Late Line ridership is thus assumed to be almost totally reliant on UT riders, as was highest in January 2008 at the start of Spring Semester and in October 2008.

Route 86 – Late Line Trolley
Average Daily Ridership Levels by Month
(November 2007 to October 2008)



Current Ridership Characteristics (September and October 2008)

A ridecheck survey was completed on September 5 and October 18, 2008, during UT's Fall semester. The following survey results are presented below:

- A graph showing ridership activity (boardings and alightings) and the number of trips per hour provided by time of day;
- A chart that presents maximum vehicle loads and corresponding load factors by time period; and,
- A map with graphics that illustrates total boarding and alighting activity by segment.

Ridecheck Survey Observations

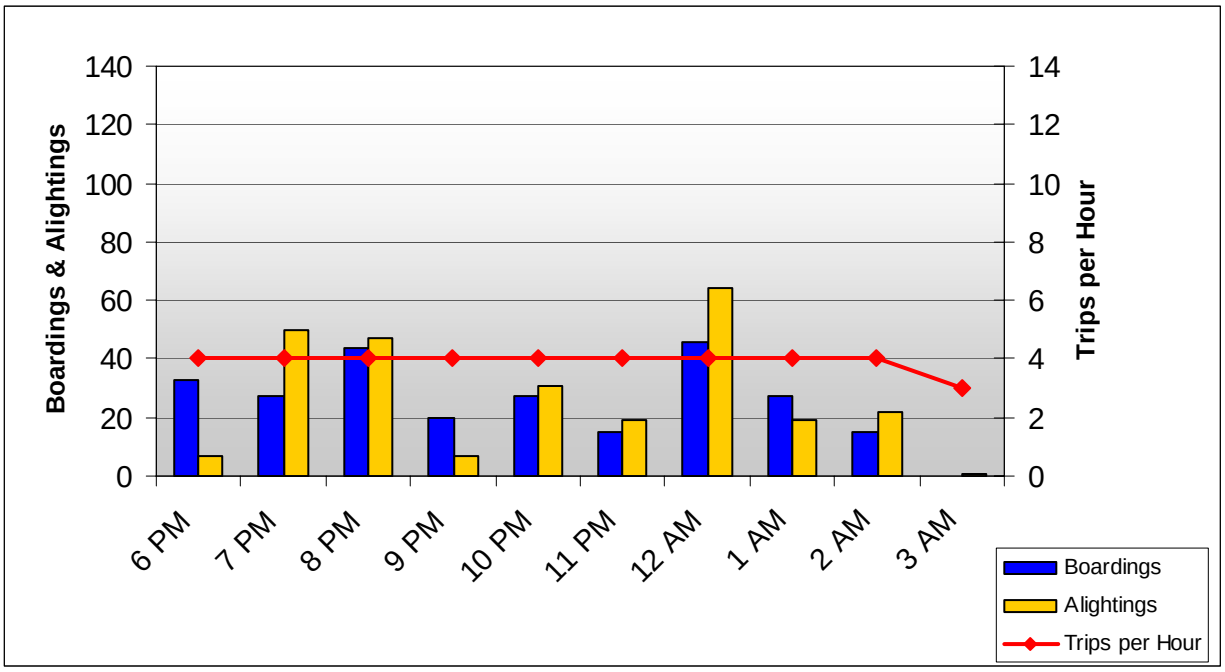
- Hourly ridership on Route 86 is highest at midnight, which can be attributed to the nature of student trips going out late at night. The evening hours of 7:00 p.m. and 8:00 p.m. had the next highest level of ridership activity.

- Ridership activity was greatest along the segment between the Residence Halls on Andy Holt Avenue and 19th Street at Cumberland Avenue, with 36 percent of the total boardings and 24 percent of the total alightings occurring along this segment. The following segment to Market Square has 22 percent of the total alightings.

- The number of trips per hour remains consistent throughout the evening, with four trips per hour.

- The maximum number of riders on-board during any one trip was highest in the evening period, with 26 riders during both the 6:00 p.m. and 7:00 p.m. hours. Consistent with a pattern of students going out late at night, maximum loads were also significant in the midnight and 2:00 a.m. hours.

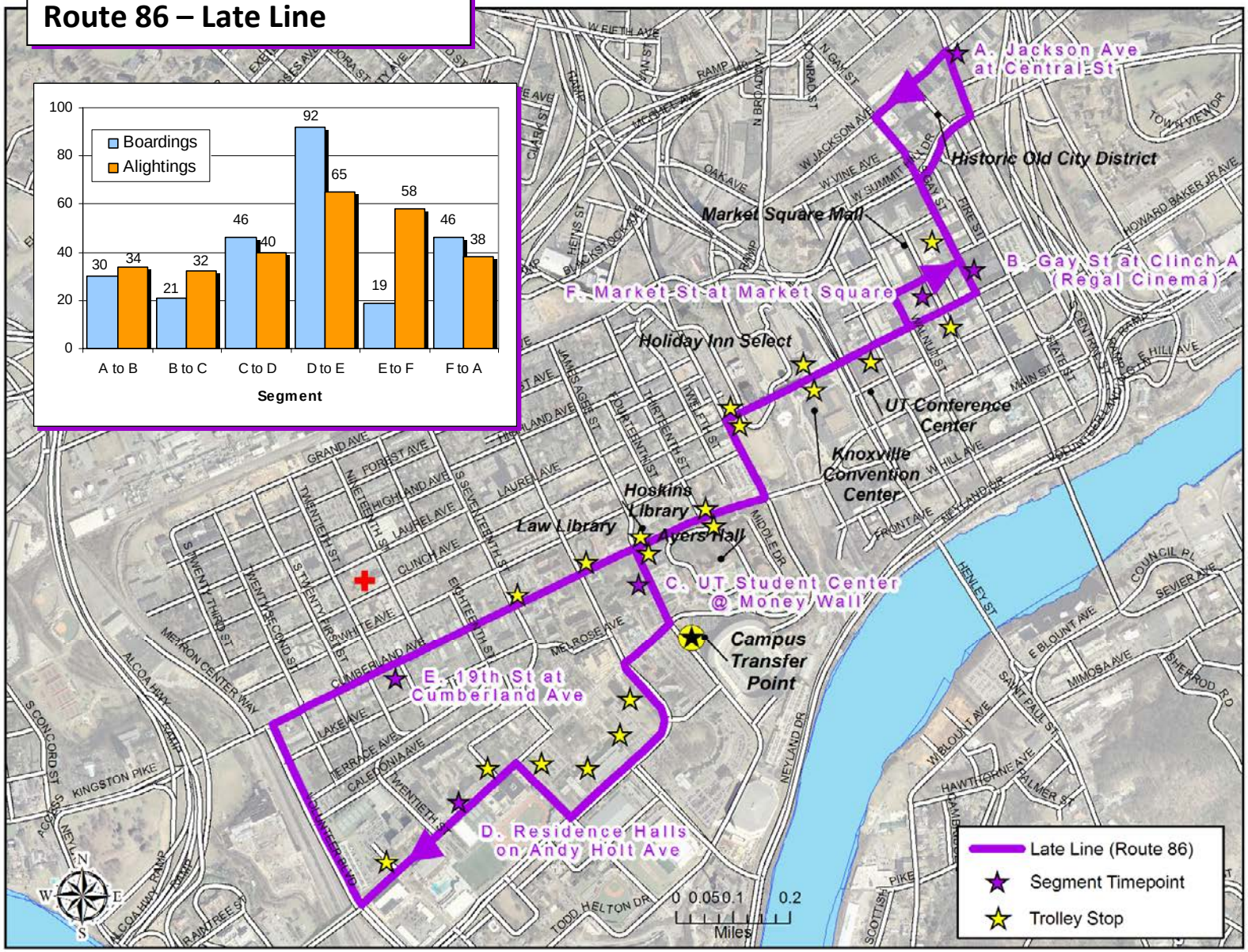
Route 86 – Late Line Trolley
Ridership and Trips Provided by Time of Day



Route 86 – Late Line Trolley
Maximum Vehicle Loads/Load Factors by Time Period

Time Period		Friday and Saturday	
		Max Load	Load Factor
Evening	6:00 p.m. - 9:00 p.m.	26	0.87
Late Night	9:00 p.m. - 12:00 a.m.	12	0.40
Early AM	12:00 a.m. - 3:00 a.m.	18	0.60

Route 86 – Late Line



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3. Existing Downtown Fixed Route Bus Operations

This chapter presents a brief description of the existing transit operations in downtown Knoxville, with emphasis on operations at the Downtown Transfer Point. Existing routes and service frequencies are described, followed by a description of existing terminal operations, downtown bus route operations and existing bus trip volumes on downtown streets.

3.1 Existing Downtown Transfer Point

Knoxville Area Transit (KAT) currently operates fixed route bus operations within downtown Knoxville to and from the Downtown Transfer Point located along Main Street between Locust Street and Gay Street, primarily in front of the City County Building. Amenities at the existing Downtown Transfer Point are limited, and consist of several covered shelters along the south side of Main Street. Buses operate on Main Street in mixed traffic and load and unload passengers along the curb.

KAT moved its on-street transfer operations to this location in 2004 when the Market Street Garage was constructed. However, it was never intended to be KAT's permanent downtown transfer point location, due to operational problems and potential safety hazards. Studies had been underway since the early 1990s to identify an appropriate site for a permanent central transit center that would house passenger waiting and transfer facilities for existing and future buses. These efforts are now coming to fruition with the construction of Knoxville Station on Church Avenue above the James White Parkway.

Bus service to and from the Downtown Transfer Point is currently operated using a pulse schedule with buses departing and arriving every 15 minutes throughout the day. Buses depart the Downtown Transfer Point on the hour (:00), quarter past the hour (:15), half past the hour (:30) and quarter to the hour (:45). Most inbound buses do not have layover time at the Downtown Transfer Point, allowing very little time for patrons to transfer between buses.

3.2 Existing Bus Service Characteristics

KAT currently operates 20 local routes, four trolley routes, three express routes, and a number of University of Tennessee Transportation System (The T) routes. Of these routes, 18 local routes, two trolley routes, and the three express routes serve the Downtown Transfer Point. Peak period service levels for local routes range from 30 minutes to 60 minutes, while the trolleys operate every five to eight minutes. Local and express route downtown configurations are addressed in this chapter. Please refer to Chapter 2 for a discussion of the existing trolley routes.

Table 3-1 identifies service characteristics for those weekday routes serving downtown Knoxville and the Downtown Transfer Point. In the same manner, Tables 3-2 through 3-3 present service characteristics for the Saturday and Sunday routes serving the Downtown Transfer Point.

Table 3-1
Existing Weekday Downtown Knoxville Bus Service Characteristics

Service Type	Route #	Route Name	Route Pattern	Service Frequencies			Peak Trips/Hr.
				Peak Periods	Midday Period	Night Period	
Local	10	Cherokee Blvd.	KAT TP to Kingston Pike/Forest Park	60	60	n/a	1
	11A	Kingston Pike	KAT TP to Parkwest Hosp.	60	60	n/a	1
	11B		KAT TP to Windsor Square	60	60	n/a	1
	11W		KAT TP to West Town Mall	n/a	n/a	60	n/a
	12	Western Ave.	KAT TP to 640 Plaza	30	60	n/a	2
	12C	Western Ave. Combo (12-13-14)	KAT TP to 640 Plaza	n/a	n/a	60	n/a
	13	Lonsdale	KAT TP to Middlebrook/Mingle	30	60	n/a	2
	14	College Street	KAT TP to Sherman/Delaware	30	30	n/a	2
	20A/C	Central Avenue	KAT TP to Northwest Crossing/Walmart	60	60	60	1
	20B		KAT TP to Broadway/Adair Apartments	60	60	n/a	1
	21	Lincoln Park	KAT TP to Chickamauga/Broadway	60	60	n/a	1
	22	Broadway	KAT TP to Garden/Jacksboro Pike	30	30	60	2
	23	Millertown Pike/Fairmont	KAT TP to Knoxville Center Mall	30	60	60	2
	30	Washington Avenue	KAT TP to Cecil/Crockett	45	45	n/a	1.33
	31	Magnolia Ave.	KAT TP to Chilowee/Holston Dr.	30	30	60	2
	33	Martin Luther King, Jr.	KAT TP to Ault/Holston Dr.	30	60	n/a	2
	32A	Dandridge Ave.	KAT TP to Golden Age Retirement Home	60	120	n/a	1
	32B		KAT TP to St. Mary's Holston Health & Rehab	60	120	n/a	1
	32C	Dandridge Ave. Combo (32-33)	KAT TP to Golden Age Retirement Home	n/a	n/a	120	n/a
			KAT TP to St. Mary's Holston Health & Rehab	n/a	n/a	120	n/a

Table 3-1 (continued)
Existing Weekday Downtown Knoxville Bus Service Characteristics

Service Type	Route #	Route Name	Route Pattern	Service Frequencies			Peak Trips/Hr.
				Peak Periods	Midday Period	Night Period	
Local (Cont.)	40A	South Knoxville	Counterclockwise Loop	60	60	n/a	1
	40B		Clockwise Loop	60	60	n/a	1
	41	Chapman Hwy.	KAT TP to Wal Mart	30	60	60	2
	42	Ft. Sanders & UT Hosp.	KAT TP to UT Hospital	45	45	n/a	1.33
	42C	UT Hosp./S. Knox Combo (40-42)	KAT TP to Montgomery Village	n/a	n/a	60	n/a
	90A	Crosstown Loop	Counterclockwise Loop	60	60	n/a	1
	90B		Clockwise Loop	60	60	n/a	1
Trolley	80	Blue Line	Coliseum Area to Downtown Loop	5	10	n/a	12
	82	Orange Line	Downtown to UT/Cumberland Strip	8	8	n/a	7.5
Express	100X	Halls Express	Halls Shopping Plaza to Downtown & UT	2 one-way trips	n/a	n/a	1
	101X	Cedar Bluff Express	Cedar Bluff P&R to UT & Downtown	6 one-way trips	n/a	n/a	2
	102X	Farragut Express	Farragut P&R to UT & Downtown	4-8 one-way trips	n/a	n/a	2

Table 3-2
Existing Saturday Downtown Knoxville Bus Service Characteristics

Service Type	Route #	Route Name	Route Pattern	Service Frequencies		Base Trips/Hr.
				Base Period	Night Period	
Local	10	Cherokee Blvd.	KAT TP to Kingston Pike/Forest Park	60	n/a	1
	11A/B	Kingston Pike	KAT TP to Windsor Square via Parkwest Hosp.	60	n/a	1
	11W		KAT TP to West Town Mall	n/a	60	n/a
	12C	Western Ave. Combo (12-13-14)	KAT TP to 640 Plaza	30	60	2
	15	West Town Non-Stop	KAT TP to West Town Mall	60	n/a	1
	20A/C	Central Avenue	KAT TP to Northwest Crossing/Walmart	60	60	1
	21	Lincoln Park	KAT TP to Chickamauga/Broadway	60	n/a	1
	22	Broadway	KAT TP to Garden/Jacksboro Pike	60	60	1
	23	Millertown Pike/Fairmont	KAT TP to Knoxville Center Mall	60	60	1
	30	Washington Avenue	KAT TP to Cecil/Crockett	60	n/a	1
	31	Magnolia Ave.	KAT TP to Chilowee/Holston Dr.	60	60	1
	32A	Dandridge Ave.	KAT TP to Golden Age Retirement Home	120	n/a	0.5
	32B		KAT TP to St. Mary's Holston Health & Rehab	120	n/a	0.5
	32C	Dandridge Ave. Combo (32-33)	KAT TP to Golden Age Retirement Home	n/a	120	n/a
			KAT TP to St. Mary's Holston Health & Rehab	n/a	120	n/a
	33	Martin Luther King, Jr.	KAT TP to Ault/Holston Dr.	60	n/a	1
	40A	South Knoxville	Counterclockwise Loop	120	n/a	0.5
	40B		Clockwise Loop	120	n/a	0.5
	41	Chapman Hwy.	KAT TP to Wal Mart	60	60	1
	42	Fort Sanders & UT Hospitals	KAT TP to UT Hospital	60	n/a	1
	42C	UT Hosp./S. Knox Combo (40-42)	KAT TP to Montgomery Village	n/a	60	n/a
	90A	Crosstown Loop	Counterclockwise Loop	60	n/a	1
	90B		Clockwise Loop	60	n/a	1

Table 3-3
Existing Sunday Downtown Knoxville Bus Service Characteristics

Service Type	Route #	Route Name	Route Pattern	Service Frequencies		Base Trips/Hr.
				Base Period	Night Period	
Local	11W	Kingston Pike	KAT TP to West Town Mall	60	n/a	1
	22	Broadway	KAT TP to Garden/Jacksboro Pike	60	n/a	1
	31	Magnolia Ave.	KAT TP to Chilowee/Holston Dr.	60	n/a	1
	41	Chapman Hwy.	KAT TP to Wal Mart	60	n/a	1

3.3 Existing Local Service Configuration

There are five distinct route patterns that are used by KAT local bus routes for access to/from the Downtown Transfer Point during weekdays. Route patterns have been classified by the direction from which the route arrives to the Downtown Transfer Point (i.e., northwest, north, northeast, south, and west). Following is a brief description of each route pattern, each of which is graphically represented in Figure 3-1.

- **Northwest Route Pattern:** Buses that enter downtown from the northwest arrive via Western Avenue or Broadway Street. Routes that follow this pattern include: #12, 13, 21, and 22. Upon reaching the intersection of Henley Street and Summit Hill Drive, all of these routes access the Downtown Transfer Point by traveling east on Summit Hill Drive, south on Locust Street, and east on Main Street. Outbound buses for all but one route on this pattern exit the Downtown Transfer Point east on Main Street, north on Gay Street, west on Cumberland Avenue, and north on Henley Street. Route 21, however, completes a larger loop around downtown. After leaving the Downtown Transfer Point, it travels east on Main Street, north on Gay Street, and west on Summit Hill Drive. This route pattern is shown in purple in Figure 3-1.

- **North Route Pattern:** Buses that enter downtown from the north arrive via Gay Street. Upon reaching the intersection of Gay Street and Summit Hill Drive, these routes access the Downtown Transfer Point by traveling west on Summit Hill Drive, south on Locust Street, and east on Main Street. Outbound buses on this route pattern exit the Downtown Transfer Point east on Main Street and north on Gay Street. This route pattern is shown in green in Figure 3-1. Details of these route alignments further north from downtown are shown in Figure 3-2.

- **Northeast Route Pattern:** Buses that enter downtown from the northeast arrive via Hall of Fame Drive or Church Avenue. Routes that follow this route pattern include: #30, 32, 33, and the eastern half of #90A/B. Upon reaching the intersection of Church Avenue and Hall of Fame Drive, buses for all but one route access the Downtown Transfer Point by traveling south on Hall of Fame Drive, west on Hill Avenue, north on Gay Street, west on Cumberland Avenue, south on Locust Street, and east on Main Street. Route 32, however, accesses the Downtown Transfer Point west on Church Avenue, south on Gay Street, west on Cumberland Avenue, south on Locust Street, and east on Main Street. Outbound buses on this route pattern exit the Downtown Transfer Point east on Main Street, south on Gay Street, east on Hill Avenue, and north on Hall of Fame Drive. This route pattern is shown in red in Figure 3-1.

- **South Route Pattern:** Buses that enter downtown from the south arrive by traveling north across the Tennessee River on Henley Street and east on Main Street. Outbound buses on this route pattern exit the Downtown Transfer Point east on Main Street and south on Gay Street across the river. Routes that follow this pattern include: #40 and 41. These route patterns are shown in brown in Figure 3-1.

Figure 3-1
Existing Local Route Bus Patterns: Weekdays

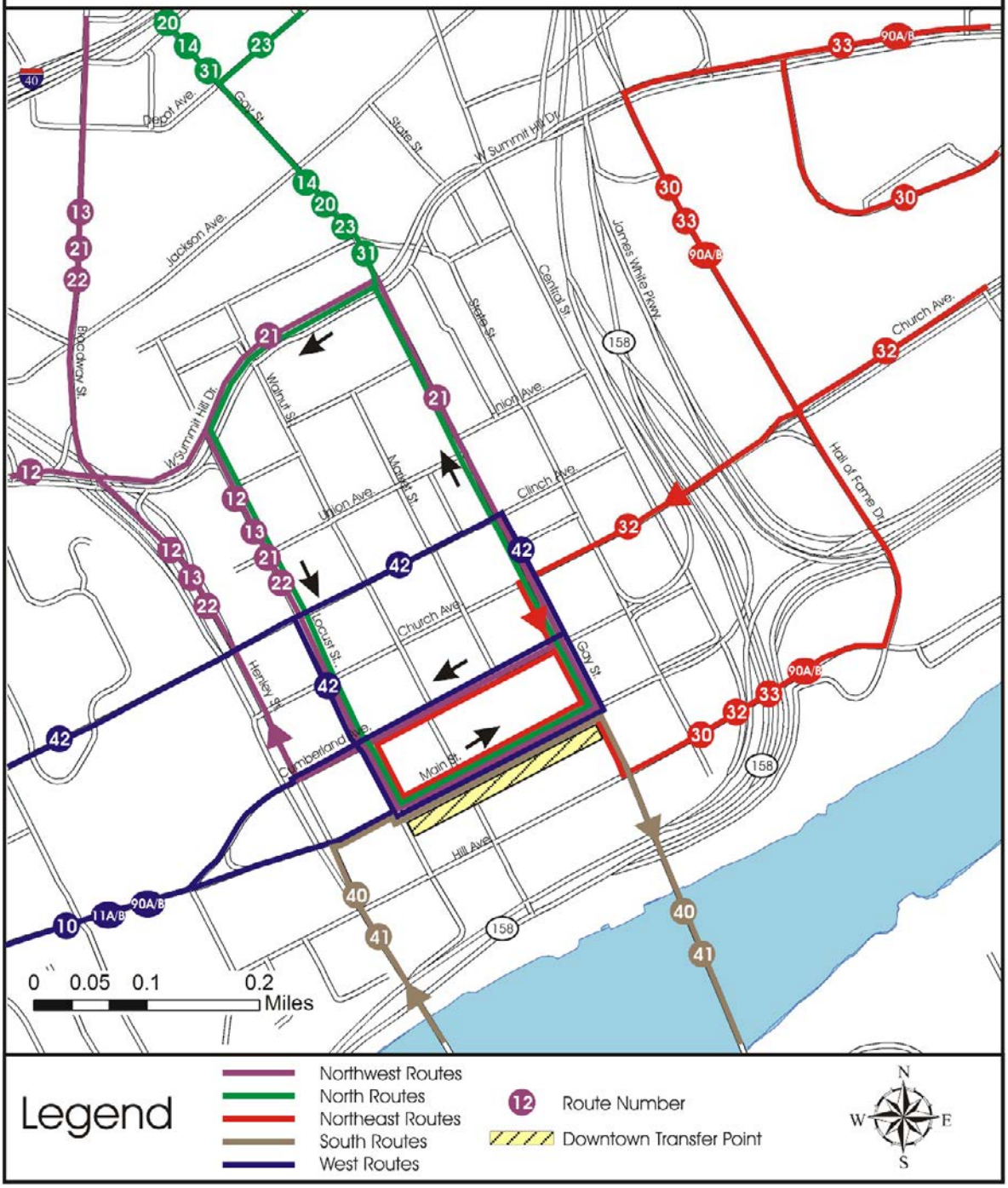
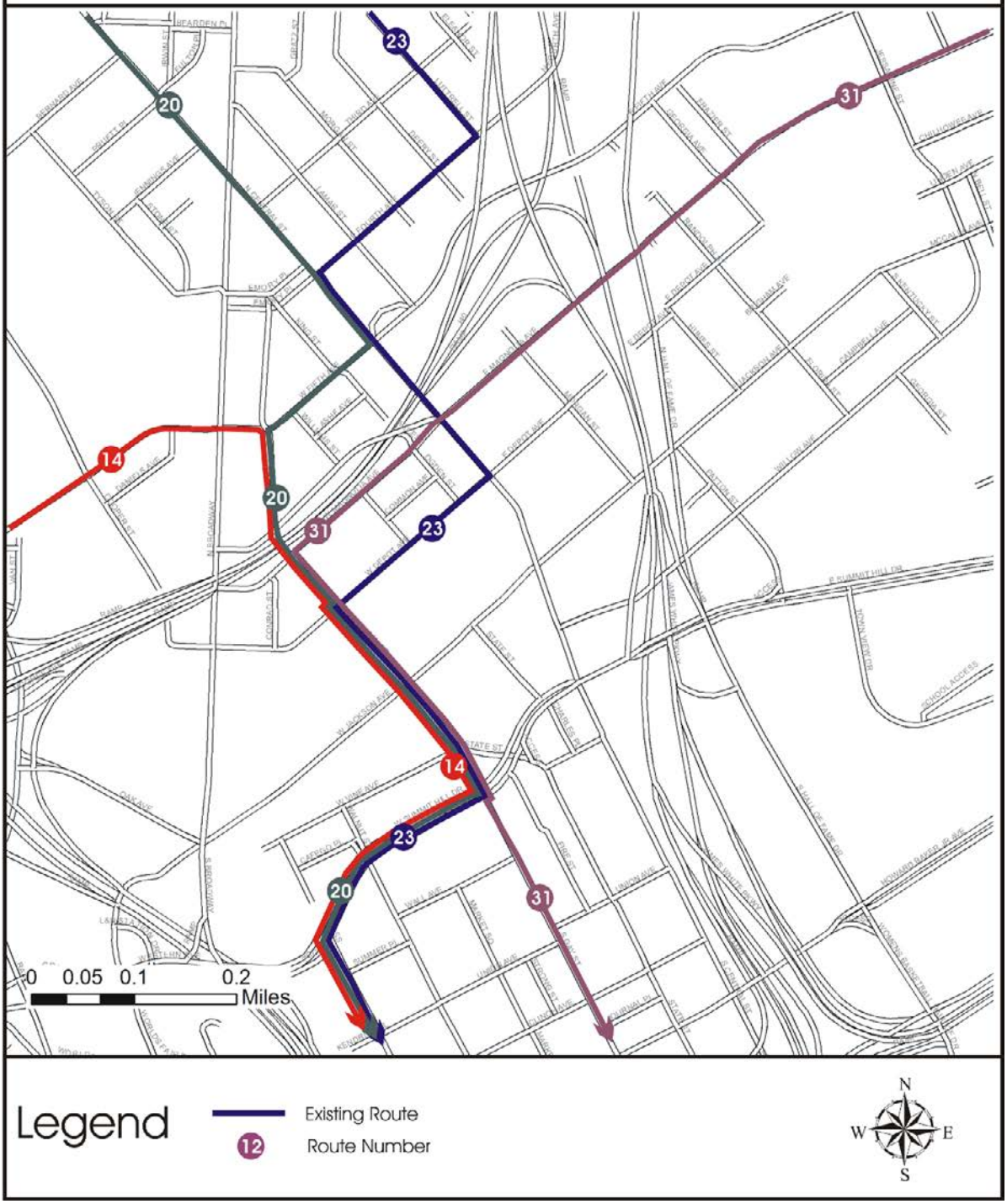


Figure 3-2
Existing Local Route Bus Patterns: North Route Details



- **West Route Pattern:** Most buses that enter downtown from the west arrive by traveling east on Cumberland Avenue and Main Street. Outbound buses on this route pattern exit the Downtown Transfer Point east on Main Street, north on Gay Street, and west on Cumberland Avenue. The exception is Route 42, which enters downtown east on Clinch Avenue, south on Locust Street, and east on Main Street. Route 42 exits downtown east on Main Street, north on Gay Street, and west on Clinch Avenue. Routes that follow this route pattern include: #10, 11A/B, 42, and the western half of #90A/B. This route pattern is shown in blue in Figure 3-1.

In the same manner, Figures 3-3 through 3-5 show the local bus route patterns for the extended night, Saturday, and Sunday periods.

3.4 Existing Weekday Route Interlines

KAT uses a technique used by many transit authority scheduling departments across the nation, this technique is called "interlining." Interlining is a term used for scheduling a vehicle to operate from one route to another through a common point during a service day (i.e., sharing a vehicle between two or more bus routes). When a vehicle is scheduled to switch over from one route to the second, the routes are said to be interlined. Optimal interlining can result in reduced costs to the agency (i.e., sharing one bus across two routes that require a half a bus each, eliminates the need to allocate one bus to each route individually) and provides a convenience to the passenger. Interlining is often done for one of the following four reasons[1]:

- Optimization of cycle times. The interlining of two routes with non-optimal cycle times at a common location can create overall compatible cycle times for the route pair. Cycle times equal the total roundtrip travel time on a route including layover time.

- Eliminate end-of-line looping. Often a vehicle is scheduled to loop around at the end of the line. This same loop may also be done by another vehicle on another route. Combining the two loops by interlining reduces redundant time and mileage costs.

- Lack of layover locations. Locating suitable locations for a vehicle to "park" during layover is often difficult or impossible in certain areas. Interlining can allow the vehicle to layover at a location on another route.

- Reducing passenger transfers. For passengers traveling to a location that requires them to transfer from one bus to another, an interline of those routes eliminates the need to make a transfer (i.e., exit one bus and re-board a second bus).

KAT currently interlines routes through the Downtown Transfer Point. Table 3-4 lists the current interline route pairs and non-interlined routes serving the Downtown Transfer Point. This table also shows the current weekday frequencies, round trip running times, round trip mileages, and average travel speeds. The three interline pairs shown in italics are those currently operated with 20-passenger propane vans, rather than standard 30 to 40 foot buses.

[1] Source: Transit Cooperative Research Program (TCRP), Report 30 – Transit Scheduling: Basic and Advanced Manuals, 1998.

Figure 3-3
Existing Local Route Bus Patterns: Extended Night

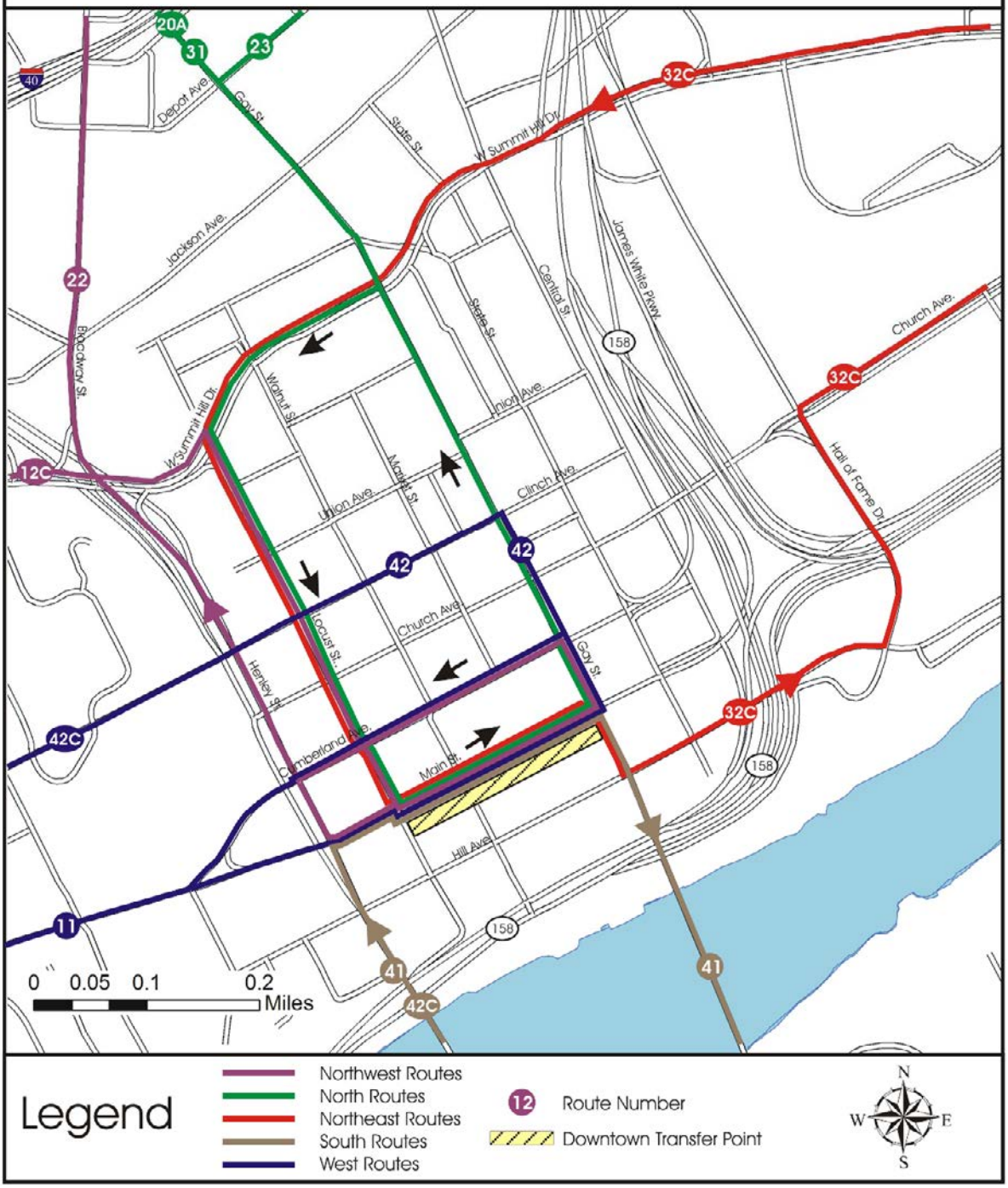


Figure 3-4
Existing Local Route Bus Patterns: Saturdays

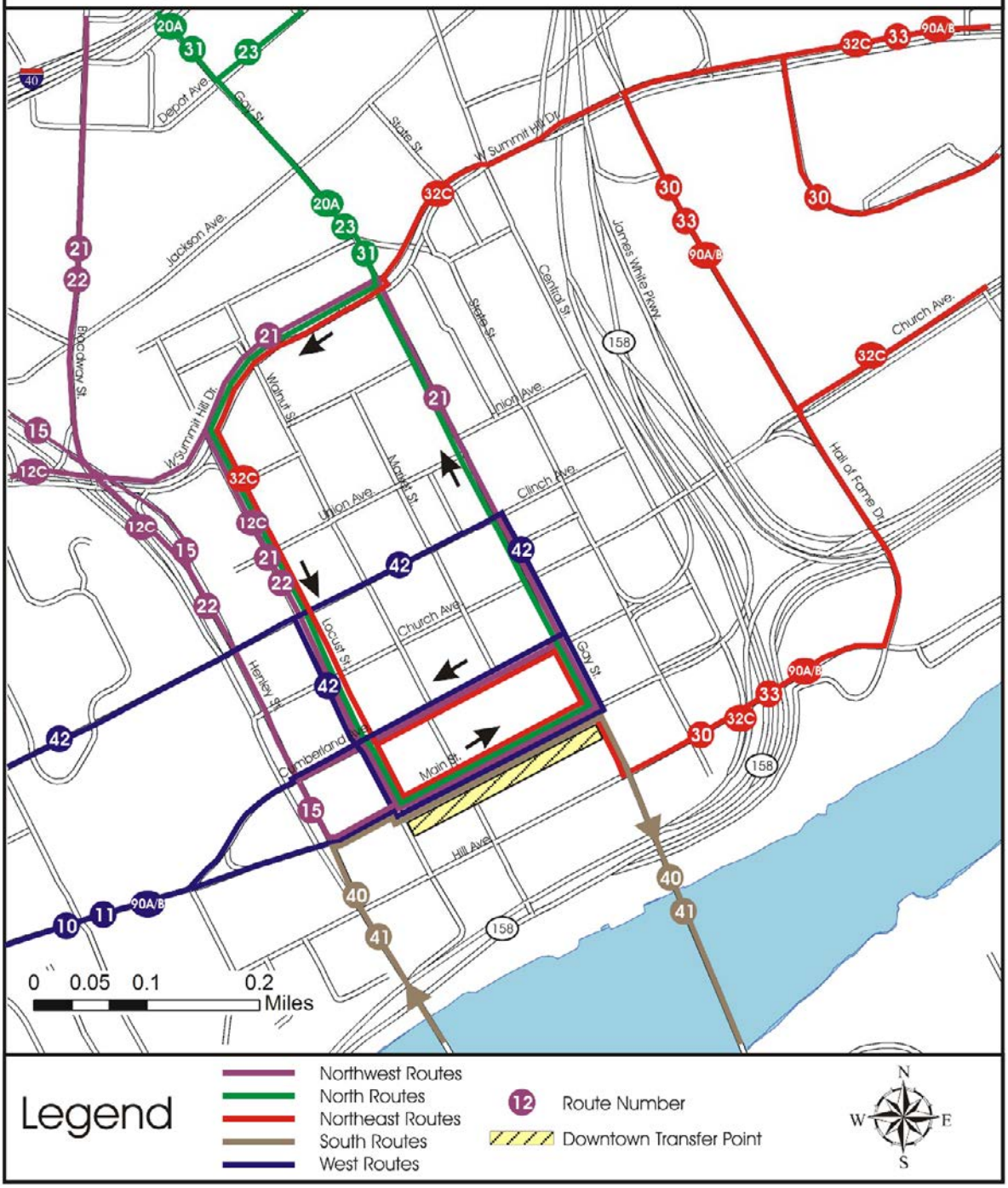


Figure 3-5
Existing Local Route Bus Patterns: Sundays

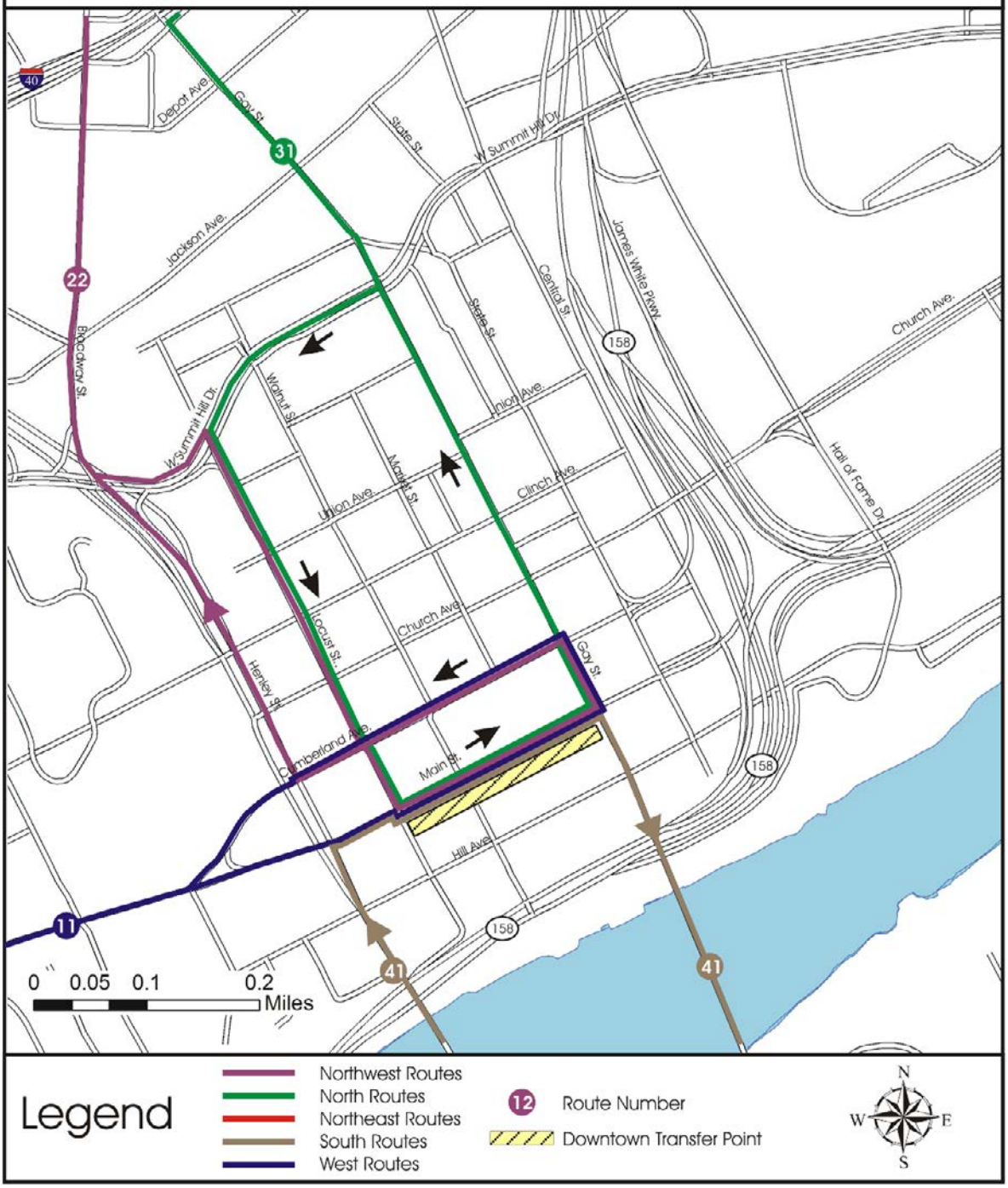


Table 3-4
Existing Downtown Transfer Point Local Routes

Interlined Routes	Frequency	Current Operation		
		Round Trip Running Time	Round Trip Mileage	Average Travel Speed
10 - Cherokee Boulevard	*60*	*60*	*14.9*	*14.9*
21 - Lincoln Park	*60*	*60*	*12.5*	*12.5*
				13.7
11 - Kingston Pike	30	120	28.5	14.3
31 - Magnolia Avenue	30	60	12.1	12.1
				13.2
12 - Western Avenue	60/30 peak	60	15.8	15.8
33 - Martin Luther King Jr. Boulevard	60/30 peak	60	13.4	13.4
				14.6
13 - Beaumont	*60/30 peak*	*60*	*10.3*	*10.3*
23 - Millertown Pike	*60/30 peak*	*60*	*16.9*	*16.9*
				13.6
14 - College Street	30	50	10.6	12.7
22 - Broadway	30	70	16	13.7
				13.2
20 - Central Avenue	30	60	17.5	17.5
40 - South Knoxville	30	60	15.6	15.6
				16.6
30 - Washington Avenue	*45*	*45*	*8.4*	*11.2*
42 - Fort Sanders	*45*	*45*	*7.3*	*9.7*
				10.5
90A - Crosstown Loop	60	150	37.6	15.0
90B - Crosstown Loop	60	150	37.6	15.0
				15.0
Non-Interlined Downtown Routes				
32 - Dandridge Avenue	60/30 peak	60	13.8	13.8
41 - Chapman Highway	60/30 peak	60	14.6	14.6

Routes shown in italics are operated with 20-passenger propane vans.

Average combined travel speeds for the interlined routes range from approximately 10 miles per hour (mph) to almost 17 mph. Most, however, are in the 13 to 14 mph range, which is a reasonable average speed for local routes.

3.5 Existing Downtown Street Bus Trip Volumes

Bus service routings described in Section 3.3 above were used to determine existing local bus volumes on downtown streets. Figure 3-6 presents weekday peak hour local bus volumes by street segment within the downtown service area. Table 3-5 identifies the highest existing bus trips per street segment (five or more trips per hour). The highest volumes occur eastbound on Main Street at the Downtown Transfer Point, followed by northbound on Gay Street and southbound on Locust Street between Main Street and Cumberland Avenue. Express route and trolley route volumes are not included.

Figure 3-6
Existing Bus Trips by Street Segment
Weekday Peak Hour Service

Local Routes

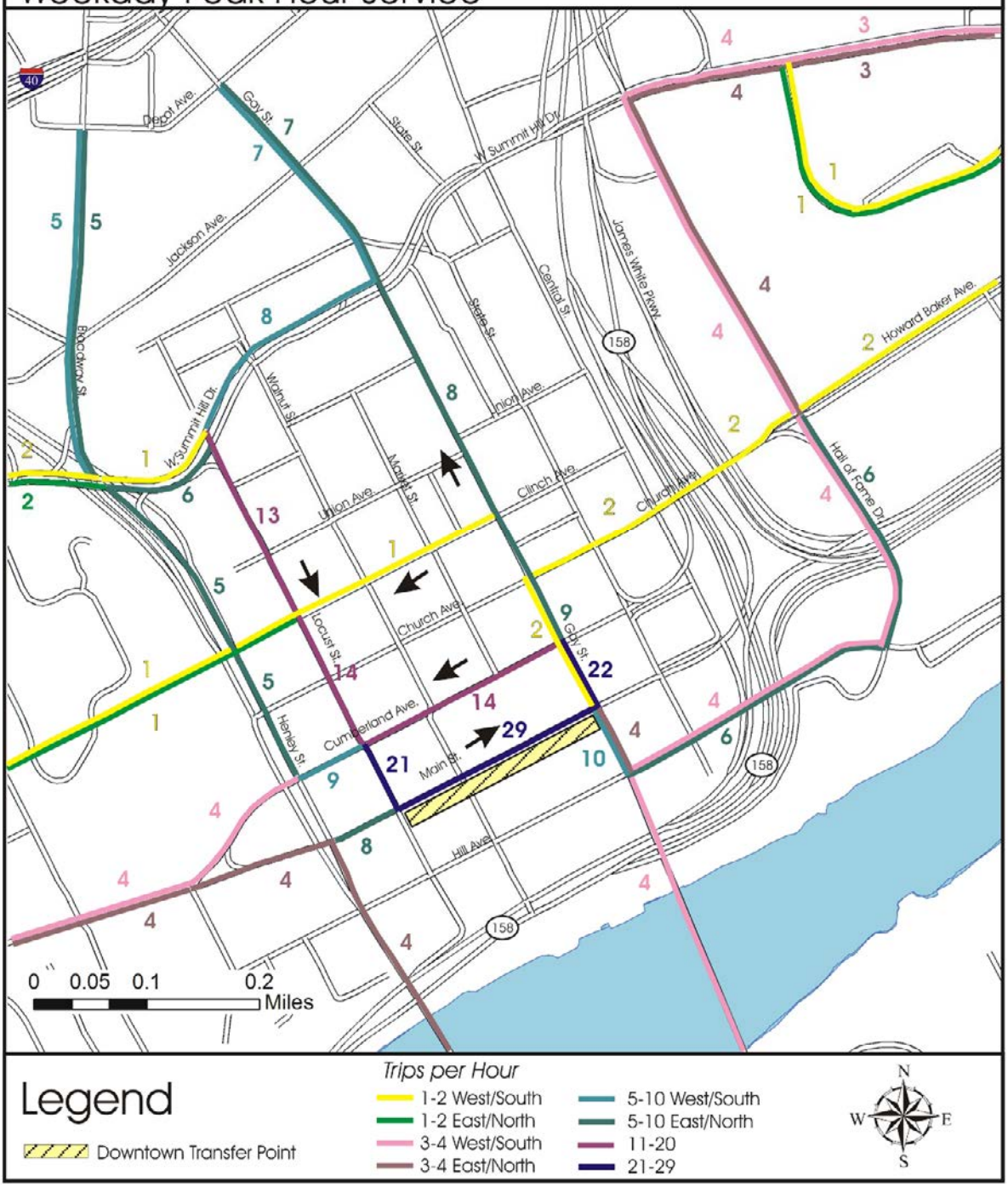


Table 3-5
Highest Existing Local Bus Trips/Street Segment (Five or More)

Street	From	To	Travel Direction	Weekday Peak Trips per Hour
Main Street	Locust Street	Gay Street	East	29
Gay Street	Main Street	Cumberland Avenue	North	22
Locust Street	Cumberland Avenue	Main Street	South	21
Cumberland Avenue	Gay Street	Locust Street	West	14
Locust Street	Clinch Avenue	Church Avenue	South	14
Locust Street	Church Avenue	Cumberland Avenue	South	14
Locust Street	W. Summit Hill Drive	Clinch Avenue	South	13
Gay Street	Main Street	E. Hill Avenue	South	10
Gay Street	Cumberland Avenue	Church Avenue	North	9
Gay Street	Church Avenue	Clinch Avenue	North	9
Cumberland Avenue	Locust Street	Henley Street	West	9
Gay Street	Clinch Avenue	W. Summit Hill Drive	North	8
Main Street	Henley Street	Locust Street	East	8
W. Summit Hill Drive	Gay Street	Locust Street	West	8
Gay Street	W. Summit Hill Drive	Depot Avenue	North	7
Gay Street	Depot Avenue	W. Summit Hill Drive	South	7
E. Hill Avenue	Gay Street	Hall of Fame Drive	East	6
Hall of Fame Drive	E. Hill Avenue	Church Avenue	North	6
W. Summit Hill Drive	Henley Street	Locust Street	East	6
Broadway Street	W. Summit Hill Drive	Depot Avenue	North	5
Broadway Street	Depot Avenue	W. Summit Hill Drive	South	5
Henley Street	Church Avenue	W. Summit Hill Drive	North	5
Henley Street	Cumberland Avenue	Church Avenue	North	5

3.6 Existing Express Service Configuration

KAT currently operates three express routes between suburban park & ride locations and downtown Knoxville and UT. These routes operate only in the weekday peak periods with a limited number of commute and reverse commute trips. Figures 3-7 and 3-8 present the downtown configuration of these routes in the morning and afternoon peak periods. Each of these routes makes a stop at TVA Towers on Summit Hill Drive and at the KAT Downtown Transfer Point and City County Building.

Figure 3-7
Existing Express Route Patterns: AM Service

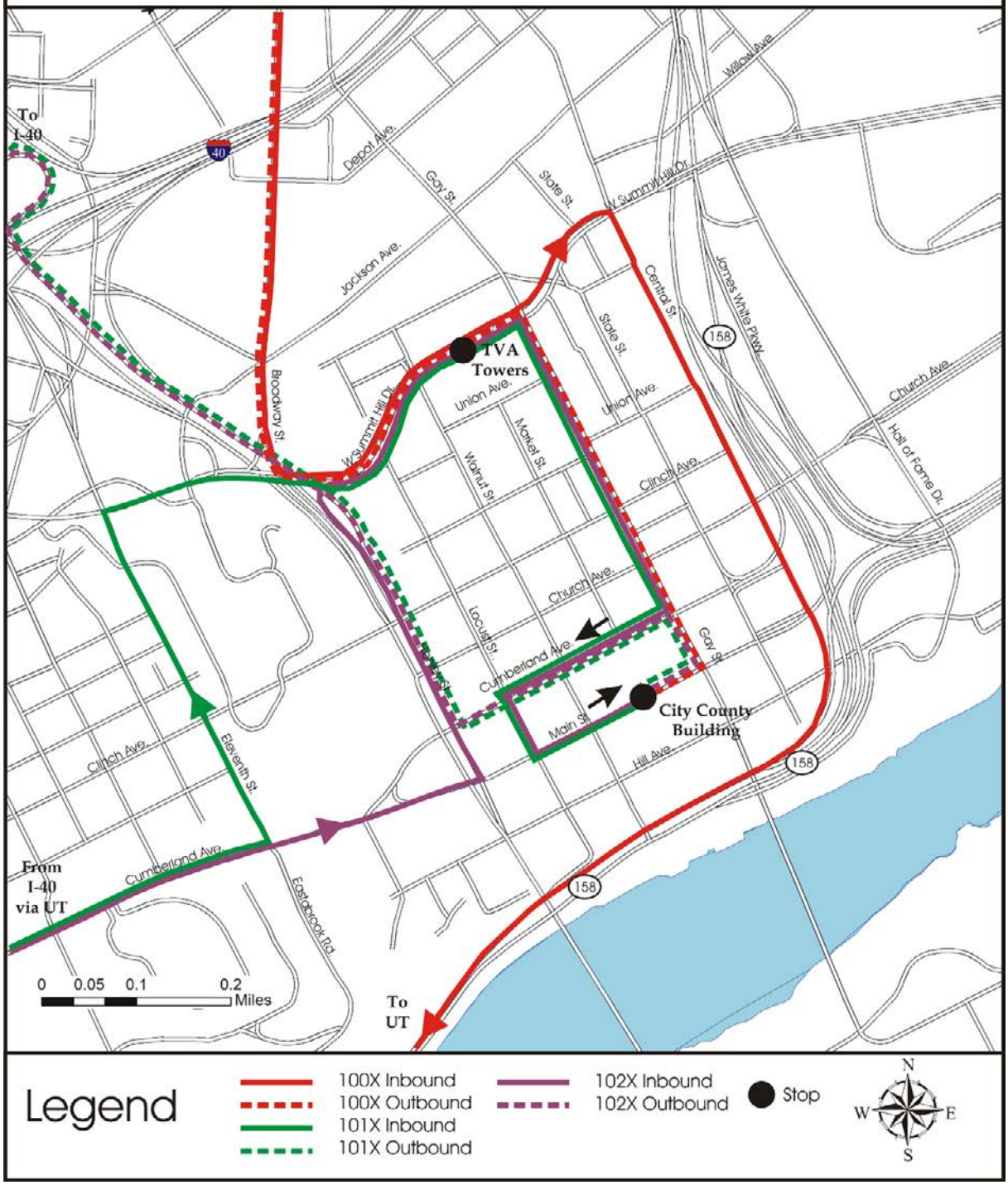
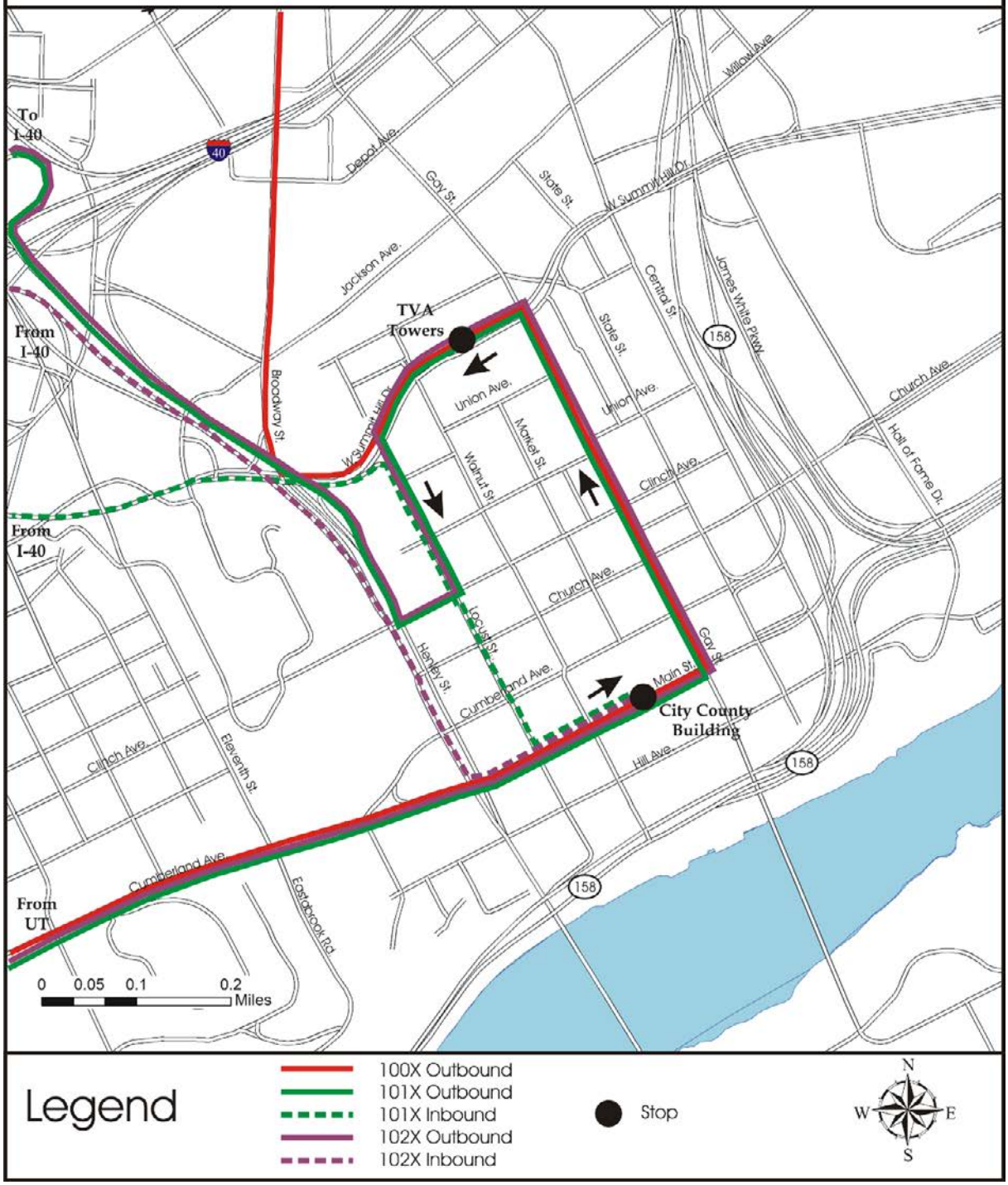


Figure 3-8
Existing Express Route Patterns: PM Service



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4. Knoxville Station Access/Egress Alternatives

This chapter outlines the development of access/egress alternatives for Knoxville Station for all existing routes. The following sections present descriptions of the Knoxville Station terminal configuration, bus access/egress to/from Knoxville Station, potential bus route alignment alternatives through downtown, to and from Knoxville Station, and the alternative preferred by KAT staff.

4.1 Knoxville Station Layout and Access/Egress

Knoxville Station, currently under construction, will have access/egress for KAT fixed route bus service via Hall of Fame Drive and Church Avenue. Figure 4-1 illustrates the layout of Knoxville Station. The Knoxville Station is designed for 20 saw-toothed bus bays, ten on each side of a protected center platform. The primary bus entrance/exit will be on Hall of Fame Drive, and will be right-in/right-out only. A second bus entrance/exit will be on Church Avenue, with a new bus actuated signal to facilitate bus movements.

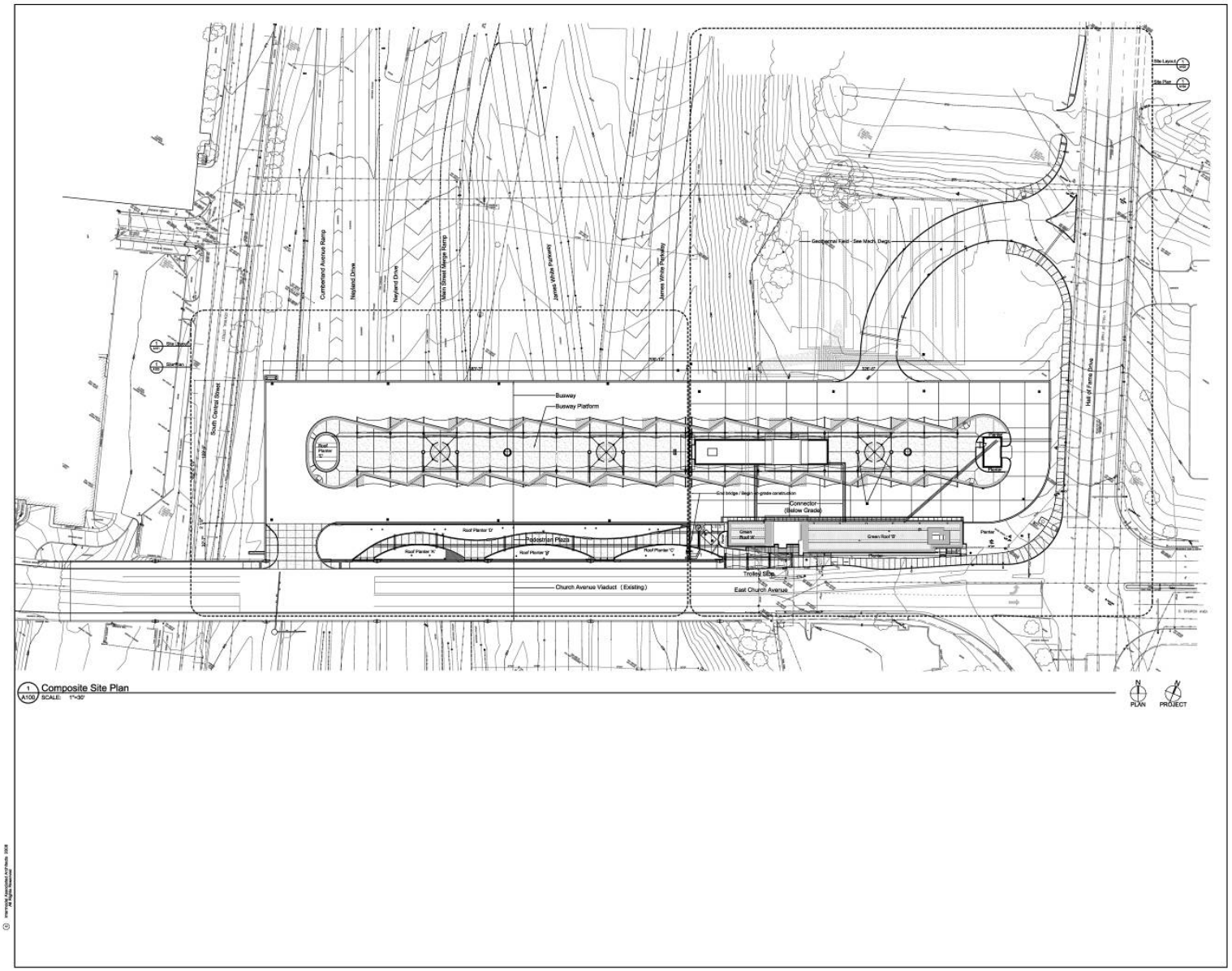
A trolley stop will be located on Church Avenue near the pedestrian entrance to the facility. Passengers transferring from a local route to a trolley route will take the escalator down from the platform, walk through the indoor facility, and exit the front door to Church Avenue to the trolley stop. Proposed trolley routes are being designed to travel westbound on Church Avenue, so that all boardings and alightings take place at the trolley stop just outside the facility and passengers need not cross the street.

4.1.1 Access Movements

As currently designed, the following Knoxville Station bus access movements to the bus platform area are possible:

- South on Hall of Fame Drive:
  - Right turn into Knoxville Station or
  - Right turn onto Church Avenue and right into Knoxville Station
- North on Hall of Fame Drive:
  - Left turn onto Church Avenue and right into Knoxville Station
- East on Church Avenue:
  - Left turn into Knoxville Station
- West on Church Avenue:
  - Right turn into Knoxville Station

Figure 4-1
Knoxville Station Terminal Layout



4.1.2 Egress Movements

As currently designed, the following Knoxville Station bus egress movements from the bus platform area are possible:

- North on Hall of Fame Drive:
  - Left turn onto Church Avenue and left onto Hall of Fame Drive

- South on Hall of Fame Drive:
  - Right turn onto Hall of Fame Drive or
  - Left turn onto Church Avenue and right onto Hall of Fame Drive

- East on Church Avenue:
  - Left turn onto Church Avenue/Howard Baker Avenue or
  - Right turn onto Hall of Fame Drive and left turn onto Howard Baker Avenue

- West on Church Avenue:
  - Right turn onto Church Avenue or
  - Right turn onto Hall of Fame Drive and right turn onto Church Avenue

4.2 Identification and Evaluation of Local Bus Route Access/Egress Alternatives

Utilizing the feasible access/egress movements to/from Knoxville Station noted above, several bus route access/egress alternatives were developed for the local routes serving downtown Knoxville. These alternatives range from diverting local routes to the edge of the downtown core to the greatest extent possible to routing through the downtown core to reach Knoxville Station

The bus route access/egress alternatives identified below were developed through modifying, shortening, or extending the existing local bus route alignments into the downtown area from the current Downtown Transfer Point to Knoxville Station. Figures 4-2 through 4-5 on the following pages identify possible access/egress route alignment alternatives for the new Knoxville Station. These alternatives were presented to TPO and KAT staff at a route workshop held on December 10, 2008. After the conclusion of the workshop, TPO and KAT staff suggested one of the alternatives be modified slightly and carried forward as their preferred alternative. Each initial alternative is briefly described below.

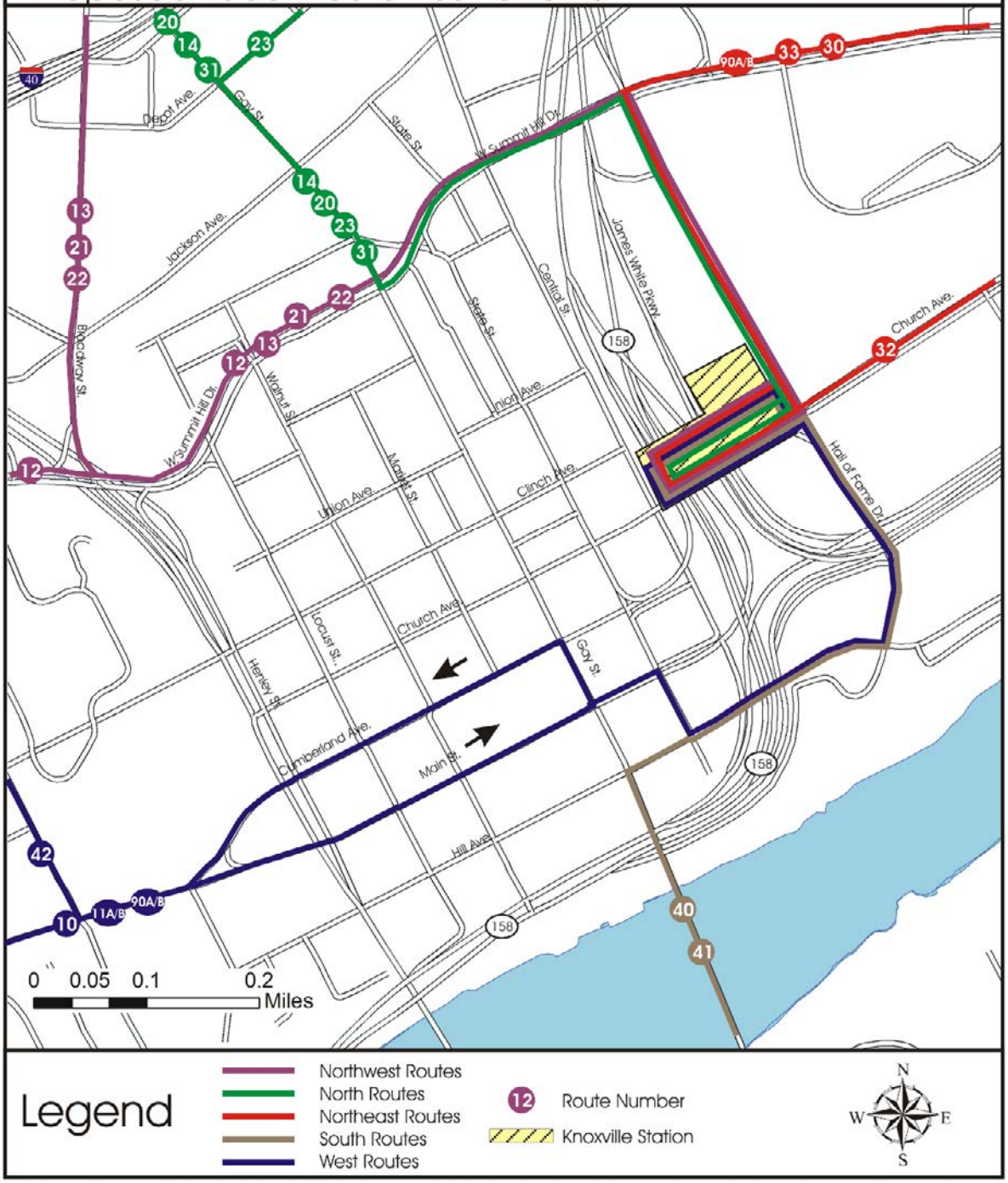
4.2.1 Alternative A

The theme of Alternative A is to avoid travelling through the downtown core to reach Knoxville Station. To accomplish this, local routes would be diverted to the edge of the downtown core to the greatest extent possible, as shown in Figure 4-2. This alternative would require a heavy emphasis on frequent trolley service between Knoxville Station and the downtown core.

Routes from the west would be the only routes penetrating the downtown core via the Main Street/Cumberland Avenue one-way pair. These routes would continue to Knoxville Station via Gay Street, Hill Avenue, and Hall of Fame Drive.

Figure 4-2
Weekday Service
Proposed Local Route Bus Patterns

Alternative A
"Avoid Downtown"



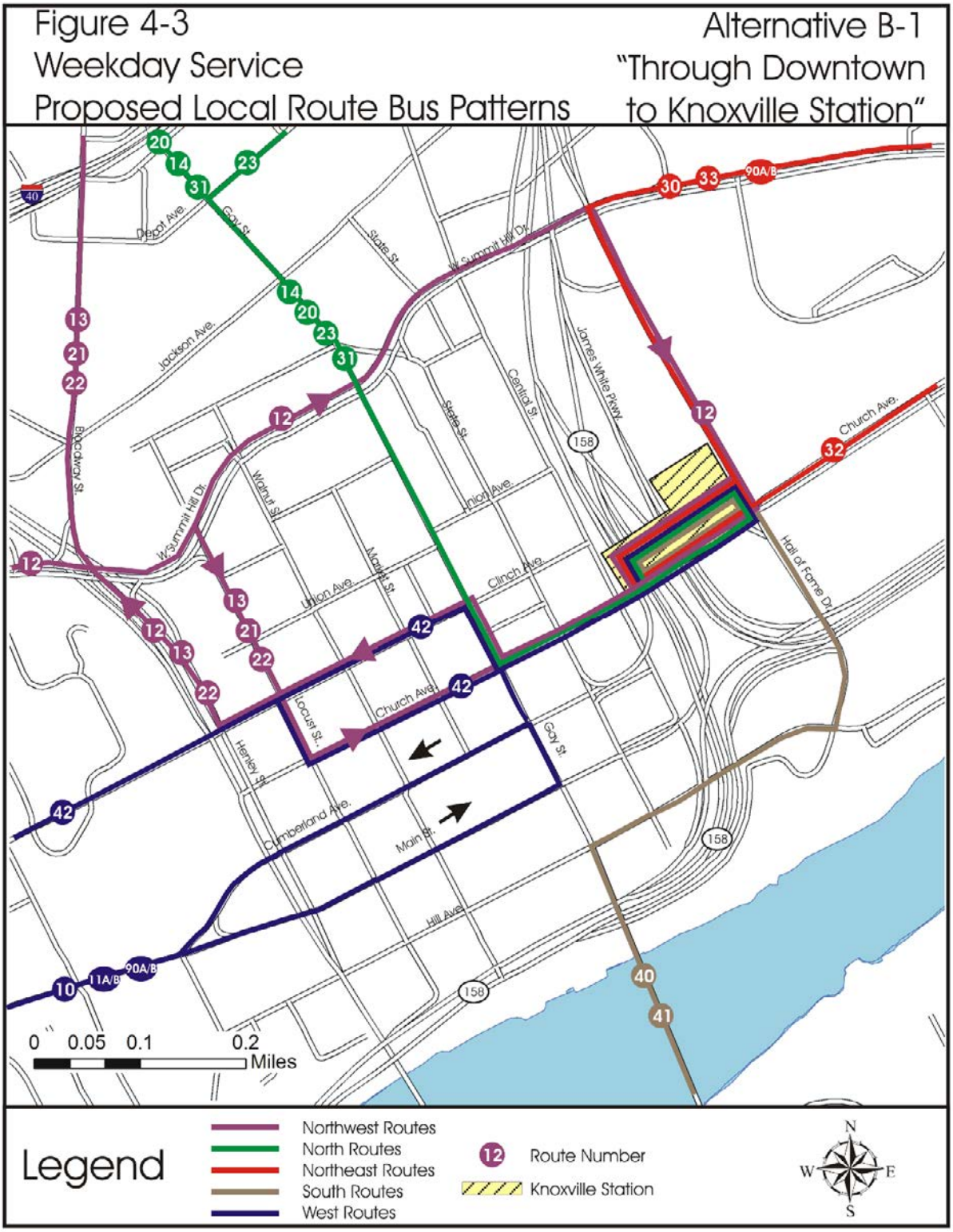


Figure 4-3
Weekday Service
Proposed Local Route Bus Patterns
Alternative B-1
"Through Downtown
to Knoxville Station"
Depot Ave.
Gay St.
State St.
W Summit Hill Dr.
Jackson Ave.
Broadway St.
Walnut St.
Central St.
James White Pkwy
Church Ave.
Union Ave.
Market St.
Clinch Ave.
Hall of Fame Dr.
Locust St.
Henley St.
Cumberland Ave.
Main St.
Hill Ave.
0 0.05 0.1 0.2 Miles
Legend
Northwest Routes
North Routes
Northeast Routes
South Routes
West Routes
Route Number
Knoxville Station
N
W
E
S

Figure 4-4
Weekday Service
Proposed Local Route Bus Patterns

Alternative B-2
"Through Downtown
to Knoxville Station"

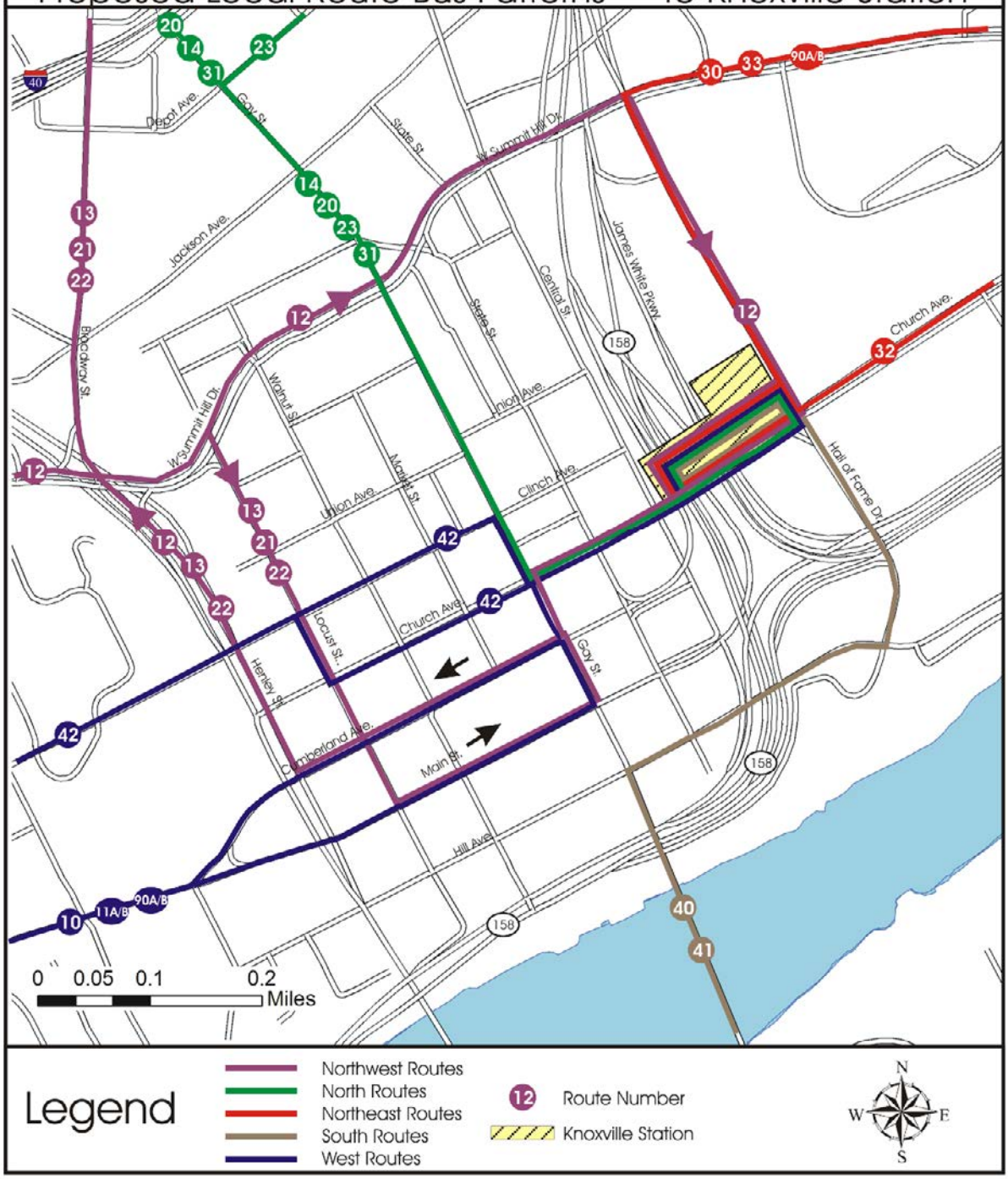
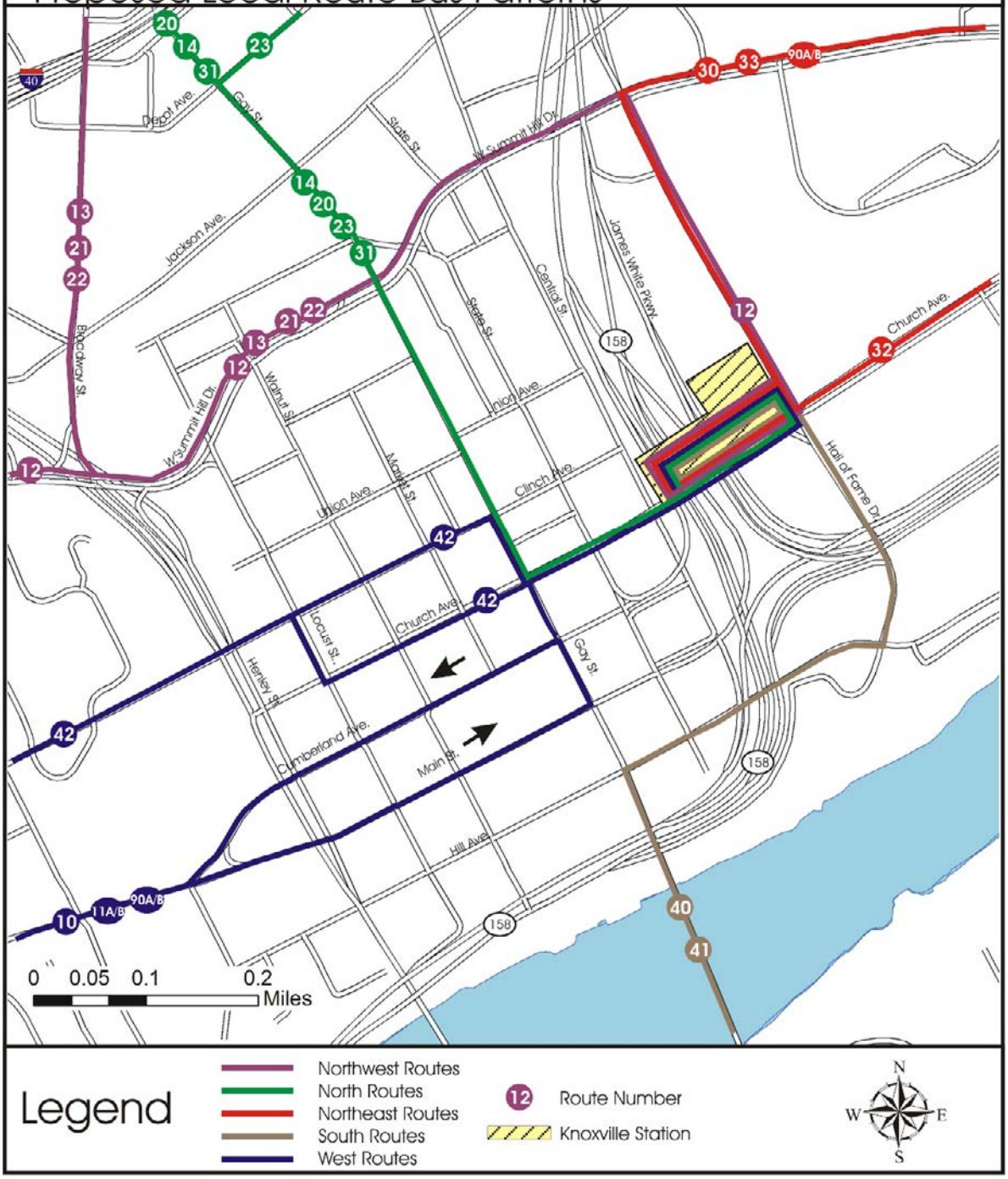


Figure 4-5
Weekday Service
Proposed Local Route Bus Patterns

Alternative C
"Hybrid"



Routes from the northwest and north would skirt the downtown core and access Knoxville Station via Summit Hill and Hall of Fame drives. Routes from the northeast would terminate at Knoxville Station, avoiding the downtown core completely. Routes from the south would cross the Tennessee River via Gay Street and access Knoxville Station via Hill Avenue and Hall of Fame Drive.

4.2.2 Alternative B

The theme of Alternative B is for most routes to travel through the downtown core to reach Knoxville Station. This alternative would maintain service on key downtown north-south and east-west streets, providing direct access to destinations in the core.

Two variations of this alternative were developed. Alternative B-1, shown in Figure 4-3, recommends that most of the routes from the northwest, as well as Route 42, would utilize Church Avenue eastbound and Clinch Avenue westbound through the center of the downtown core west of Gay Street. Church Avenue is a two-way street with two traffic lanes eastbound and one traffic lane eastbound. Clinch Avenue is a one-way street westbound with one traffic lane and one parking lane. The routes would use Church Avenue to reach Knoxville Station. The advantage of this variation is the direct travel east-west through the core of downtown to Knoxville Station. The disadvantage of this variation is that bus speeds may be reduced due to four-way stops and the need to share a single traffic lane on Clinch Avenue with other vehicles.

Alternative B-2, shown in Figure 4-4, recommends that most of the routes form the northwest continue to use the Main Street/Cumberland Avenue one-way pair through the downtown core. The routes would use Gay Street and Church Avenue to reach Knoxville Station. The advantage of this variation is that Main Street and Cumberland Avenue are both multi-lane roadways with no stop signs. These streets also provide more direct access to Knoxville's government complex. The disadvantage of this variation is that it requires out-of-direction travel between Henley/Locust streets and Knoxville Station.

Alternative B-1 and B-2 are otherwise identical. Routes from the north would access Knoxville Station via Gay Street and Church Avenue. As in Alternative A, routes from the northeast would terminate at Knoxville Station, avoiding the downtown core completely and routes from the south would cross the Tennessee River via Gay Street and access Knoxville Station via Hill Avenue and Hall of Fame Drive.

4.2.3 Alternative C

Alternative C is a hybrid between Alternative A and B. As shown in Figure 4-5, routes from the west would travel east-west through the core of downtown on their way to/from Knoxville Station and routes from the north would continue on Gay Street through downtown to Church Avenue. The remaining routes (from the northwest, northeast and south) would skirt or avoid downtown as in Alternative A.

4.3 Preferred Local Bus Route Access/Egress Alternative

After reviewing the alternatives presented above, KAT, City of Knoxville, and TPO staff indicated a preference for Alternative B-1 with some modifications, as shown in Figures 4-6 and 4-7. In the same manner, Figures 4-8 through 4-10 show the proposed local bus route patterns for the extended night, Saturday, and Sunday periods.

The recommended modifications to Alternative B-1 are as follows:

- Keep buses off of Gay Street to the greatest extent possible. To accomplish this, two of the routes from the northwest would access Knoxville Station via Summit Hill Drive and Hall of Fame Drive. As shown in Figure 4-7, buses currently coming into downtown from the north on Gay Street would be rerouted in the vicinity of the I-40 and James White Parkway interchange to Hall of Fame Drive. Similarly, routes from the west coming into downtown via Cumberland Avenue (i.e., Routes 10, 11, and 90) would turn south on Gay Street and access Knoxville Station via Hill Avenue and Hall of Fame Drive.

- Maintain some east-west coverage through the center of downtown via Church Avenue and Clinch Avenue to provide direct access to destinations in this area. To avoid having large buses pass by First Presbyterian Church on Church Avenue, the three routes providing this "through service" are ones which use small 20-passengers propane vans and do not operate on Sundays. Route 42 would utilize Clinch Avenue westbound and Church Avenue eastbound, while Route 13 and 21 would utilize Church Avenue in both directions through downtown. Westbound, Route 42 would avoid Gay Street by turning north onto State Street and west onto Church Avenue. Northbound and southbound, Routes 13 and 21 would operate on Walnut Street and Locust Street, respectively.

4.3.1 Access/Egress Movements

With this preferred configuration, Knoxville Station access/egress for these local routes would be as follows.

- Routes 13 and 21 from the northwest and Route 42 from the west:
  - Access – Left turn from Church Avenue into Knoxville Station
  - Egress – Right turn from Knoxville Station onto Hall of Fame Drive and right turn onto Church Avenue

- Routes 12 and 22 from the northwest, Routes 14, 20, 23, and 31 from the north, and Routes 30, 33, and 90 from the northeast:
  - Access – Right turn from Hall of Fame Drive into Knoxville Station
  - Egress – Left turn from Knoxville Station onto Church Avenue and left turn onto Hall of Fame Drive

- Routes 10, 11, and 90 from the west and Routes 40 and 41 from the south:
  - Access – Left turn from Hall of Fame Drive onto Church Avenue and right turn into Knoxville Station
  - Egress – Right turn from Knoxville Station onto Hall of Fame Drive

- Route 32 from the northeast:
  - Access – Right turn from Church Avenue into Knoxville Station
  - Egress – Right turn from Knoxville Station onto Hall of Fame Drive and left turn onto Howard Baker Avenue or left turn from Knoxville Station onto Church Avenue.

Figure 4-6
Weekday Service
Proposed Local Route Bus Patterns

Preferred Alternative

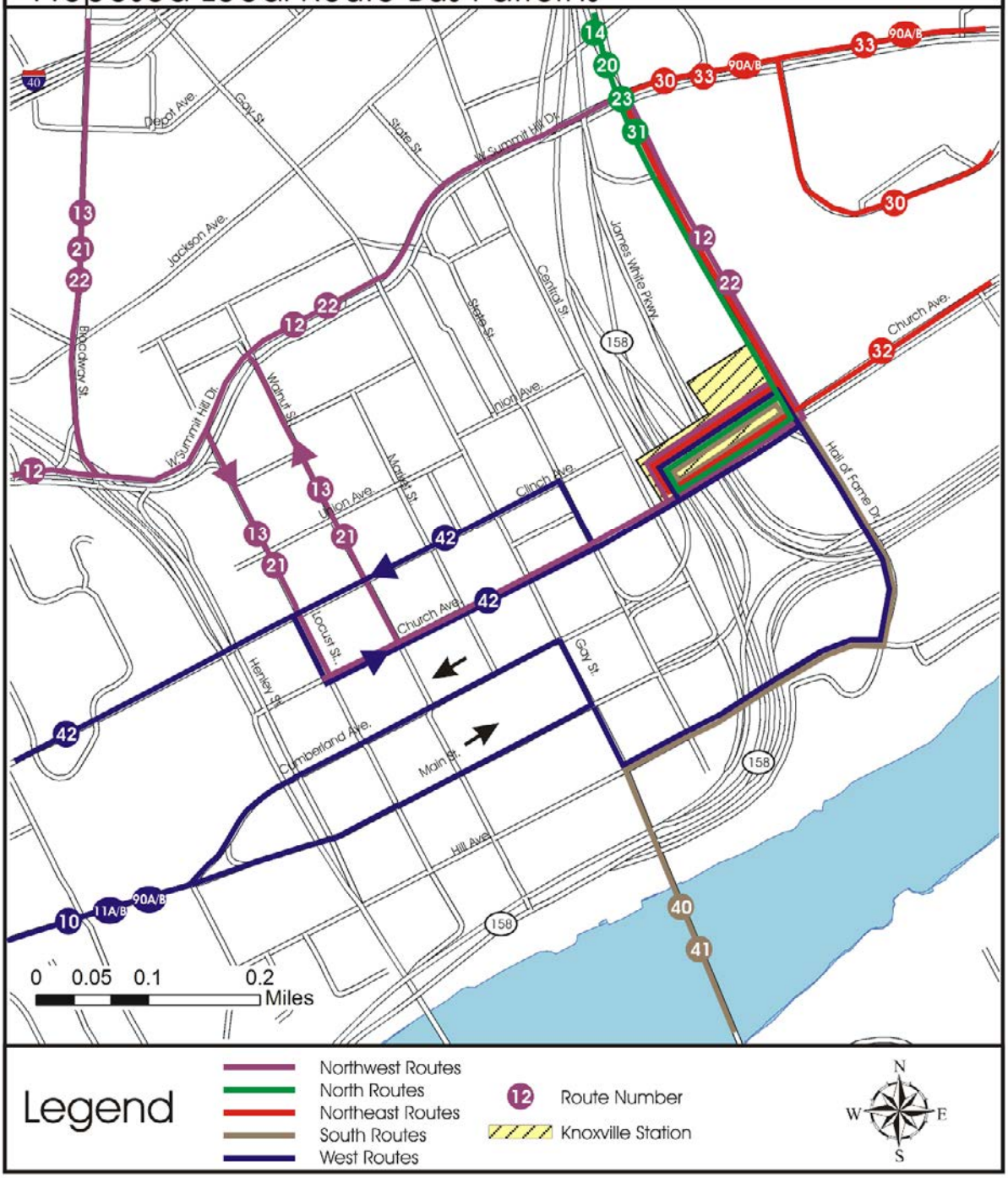


Figure 4-7
Detail of North Routes
Proposed Local Route Bus Patterns

Preferred Alternative

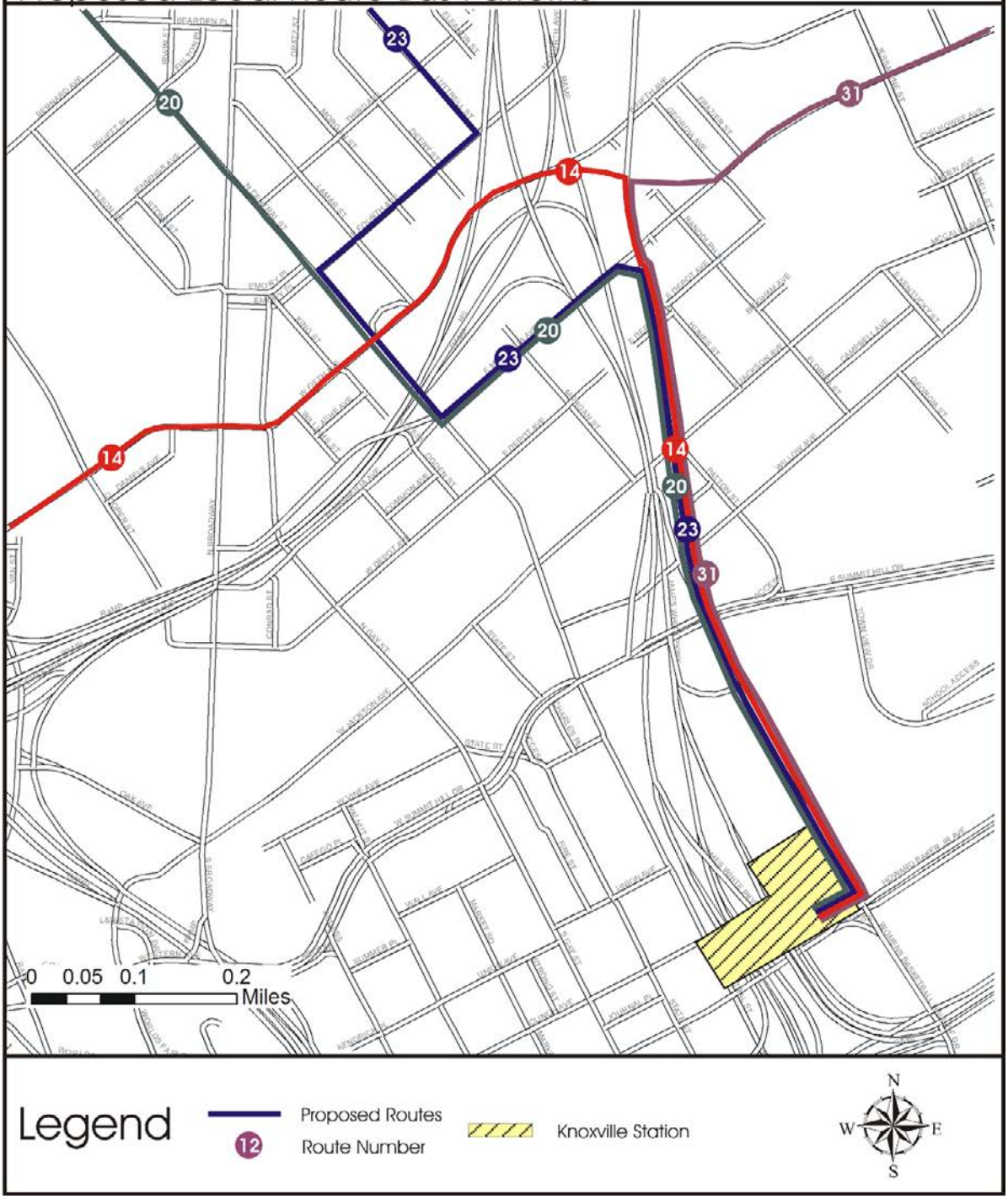
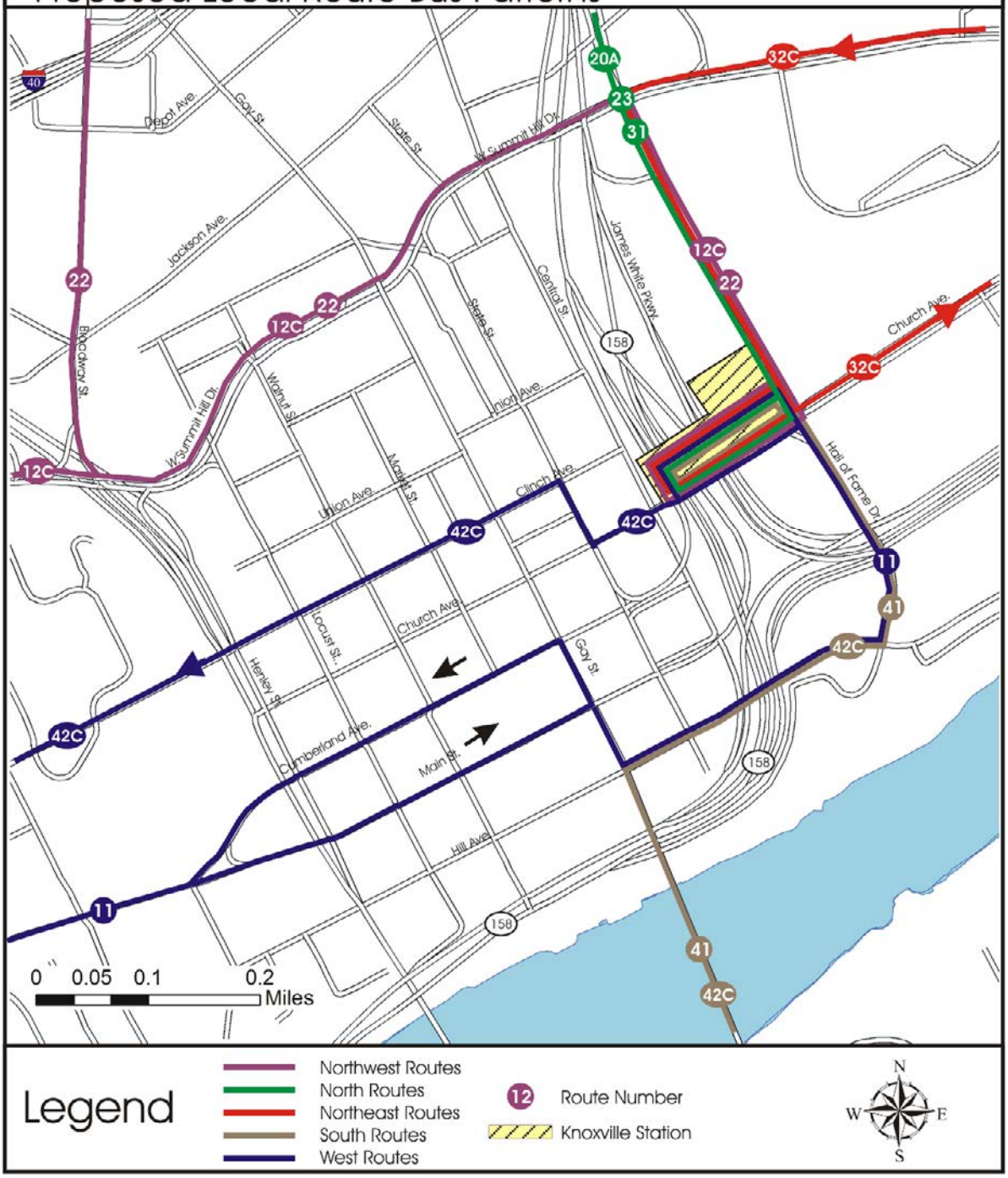


Figure 4-8
Extended Night Service
Proposed Local Route Bus Patterns

Preferred Alternative



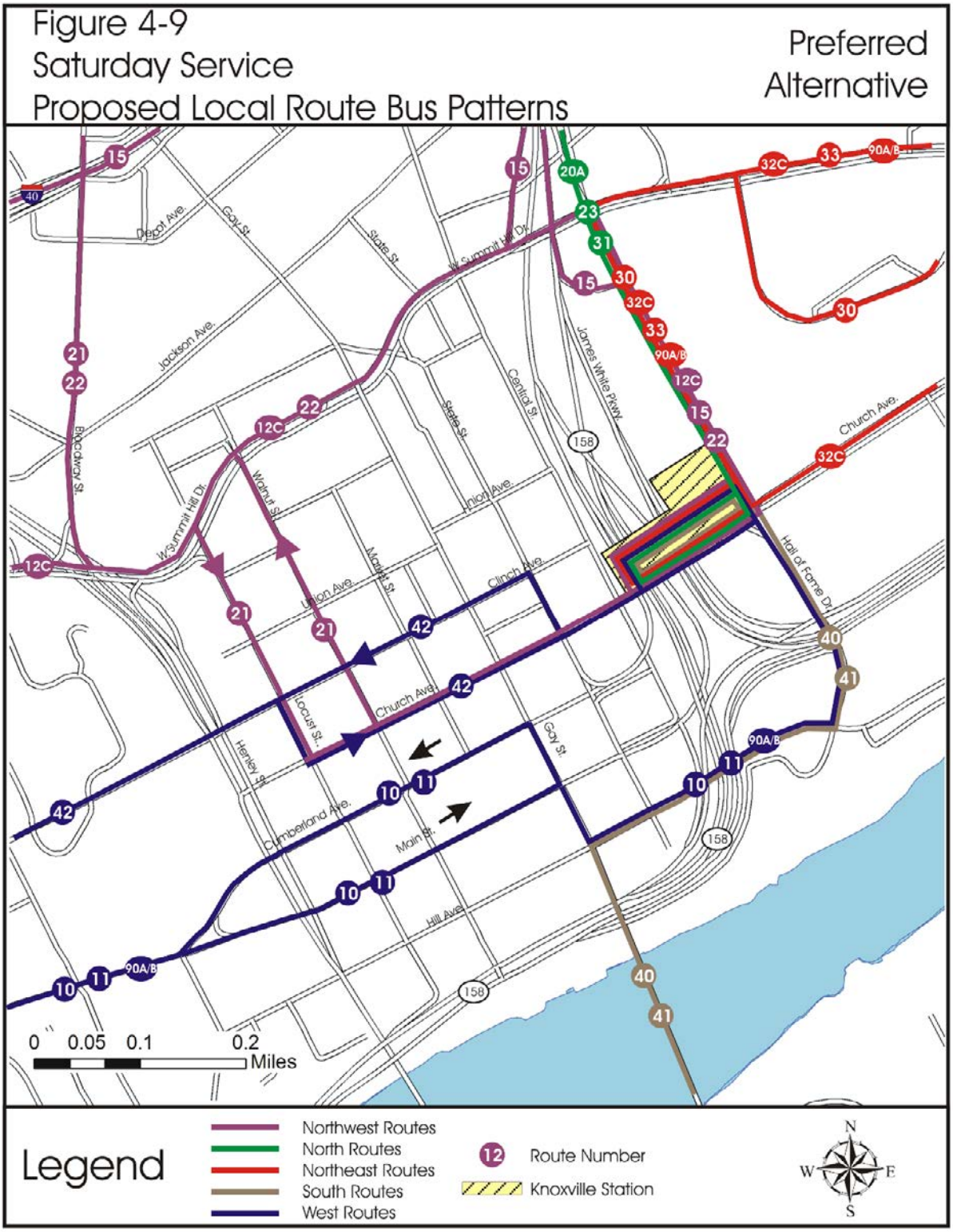
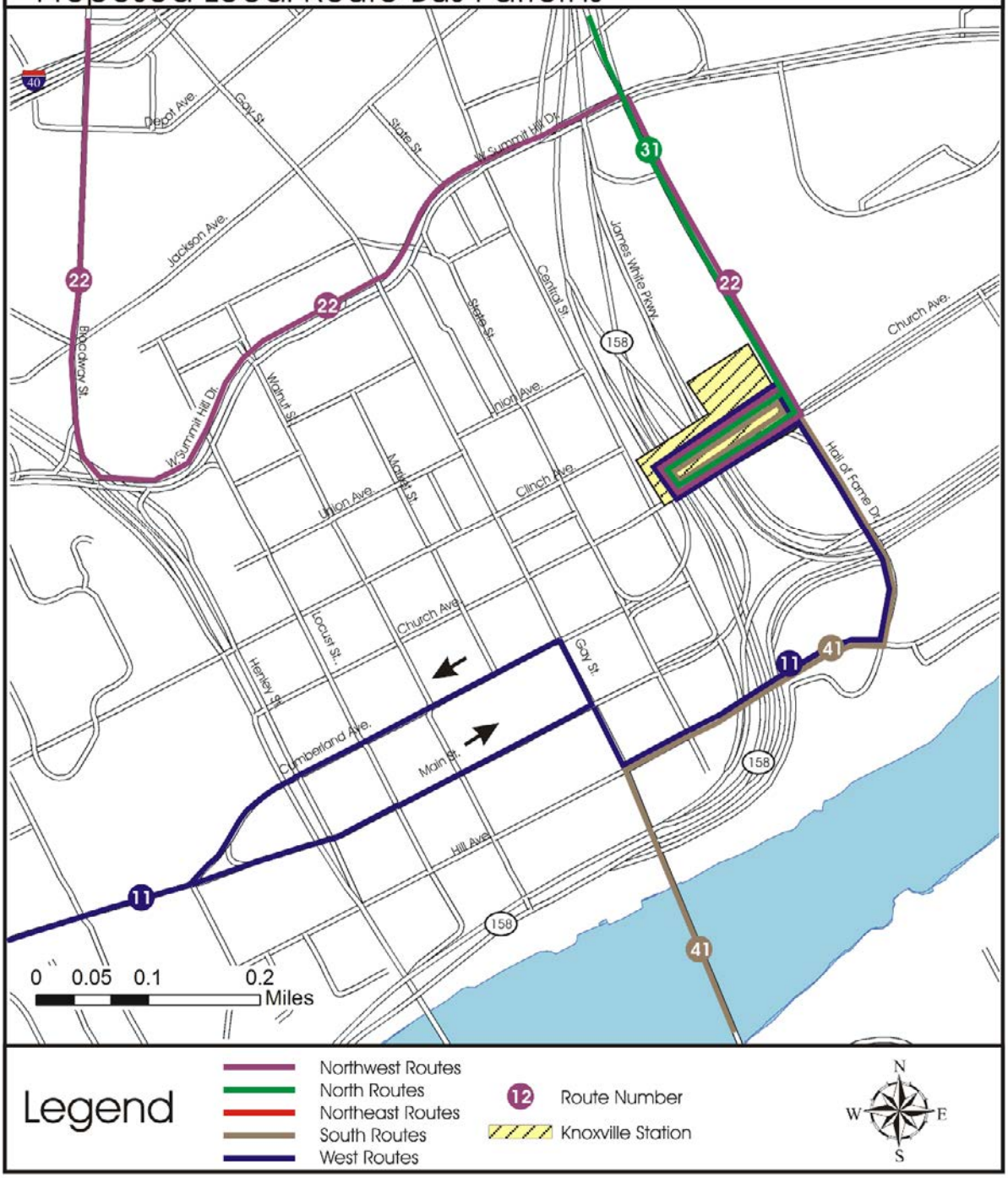


Figure 4-9
Saturday Service
Proposed Local Route Bus Patterns
Preferred Alternative
Depot Ave.
Gay St.
State St.
W Summit Hill Dr.
Jackson Ave.
Broadway St.
Central St.
James White Pkwy
Church Ave.
Hall of Fame Dr.
Union Ave.
Market St.
Clinch Ave.
Locust St.
Henley St.
Cumberland Ave.
Main St.
Hill Ave
0 0.05 0.1 0.2 Miles
Legend
Northwest Routes
North Routes
Northeast Routes
South Routes
West Routes
Route Number
Knoxville Station
N
W
E
S

Figure 4-10
Sunday Service
Proposed Local Route Bus Patterns

Preferred Alternative



4.3.2 Bus Schedule Distance and Speed Impacts

Development of the new Knoxville Station and the complete transfer of all downtown bus terminal operations from the Downtown Transfer Point to this facility results in impacts on the existing bus network serving downtown. Although moving bus terminal operations one-half mile east of its existing location may seem trivial, effects on bus travel distances and average travel speeds may be significant.

Round trip mileages and average travel speeds were used to determine the feasibility of continued operation of existing routes with no cost increases. Table 3-4 in Chapter 3 identified the existing interline pairs and their associated round trip mileages and average travel speeds. Changes in route distances were then determined based on the existing and proposed preferred alternative weekday bus patterns identified in Chapter 3 and in Figures 4-6 and 4-7. Routes from the northwest, south, and west have to travel farther to reach Knoxville Station, while routes from the northeast have shorter distances to travel, compared to the current Downtown Transfer Point. The impact on routes from the north is mixed. Assuming no change in frequencies or round trip cycle times, Table 4-1 shows the changes in route distances and the resulting average travel speeds.

Table 4-1
Knoxville Station Distance and Average Speed Impacts

Route	Current Operation			New Operation		
	Round Trip Running Time	Round Trip Mileage	Average Travel Speed	Round Trip Running Time	Round Trip Mileage	Average Travel Speed
10 - Cherokee Boulevard	*60*	*14.9*	*14.9*	*60*	*16.1*	*16.1*
11 - Kingston Pike	120	28.5	14.3	120	29.7	14.9
12 - Western Avenue	60	15.8	15.8	60	16.5	16.5
13 - Beaumont	*60*	*10.3*	*10.3*	*60*	*10.4*	*10.4*
14 - College Street	50	10.6	12.7	50	11.2	13.4
20 - Central Avenue	60	17.5	17.5	60	17.3	17.3
21 - Lincoln Park	*60*	*12.5*	*12.5*	*60*	*12.7*	*12.7*
22 - Broadway	70	16.0	13.7	70	17.0	14.6
23 - Millertown Pike	*60*	*16.9*	*16.9*	*60*	*16.7*	*16.7*
30 - Washington Avenue	*45*	*8.4*	*11.2*	*45*	*7.1*	*9.5*
31 - Magnolia Avenue	60	12.1	12.1	60	10.8	10.8
32 - Dandridge Avenue	60	13.8	13.8	60	12.5	12.5
33 - Martin Luther King Jr. Boulevard	60	13.4	13.4	60	12.0	12.0
40 - South Knoxville	60	15.6	15.6	60	16.4	16.4
41 - Chapman Highway	60	14.6	14.6	60	15.5	15.5
42 - Fort Sanders	*45*	*7.3*	*9.7*	*45*	*7.8*	*10.4*
90A - Crosstown Loop West	150	37.9	15.2	150	38.0	15.2
90B - Crosstown Loop East	150	37.9	15.2	150	37.5	15.0

Routes shown in italics are operated with 20-passenger propane vans.

Route interline pairs were then examined to determine if changes to interlines should be considered to maintain reasonable travel speeds. There are, however, some limitations on breaking up route interlines. For example, Route 14 and Route 22 must remain paired due to their different round trip running times (50 minutes and 70 minutes, respectively), which combine for a 120-minute cycle time. Similarly, Route 30 and Route 42 must remain interlines, as they are the only two route currently operating at 45-minute frequencies. The results of this analysis are presented in Table 4-2.

Table 4-2
Recommended Knoxville Station Interline Pairs

Interlined Routes	Frequency	New Operation		
		Round Trip Running Time	Round Trip Mileage	Average Travel Speed
10 - Cherokee Boulevard	*60*	*60*	*16.1*	*16.1*
21 - Lincoln Park	*60*	*60*	*12.7*	*12.7*
				14.4
12 - Western Avenue	60/30 peak	60	16.5	16.5
33 - Martin Luther King Jr. Boulevard	60/30 peak	60	12.0	12.0
				14.3
13 - Beaumont	*60/30 peak*	*60*	*10.4*	*10.4*
23 - Millertown Pike	*60/30 peak*	*60*	*16.7*	*16.7*
				13.6
14 - College Street	30	60	11.2	11.2
22 - Broadway	30	60	17.0	17.0
				14.1
20 - Central Avenue	30	60	17.3	17.3
31 - Magnolia Avenue	30	60	10.8	10.8
				14.1
30 - Washington Avenue	*45*	*45*	*7.1*	*9.5*
42 - Fort Sanders	*45*	*45*	*7.8*	*10.4*
				9.9
32 - Dandridge Avenue	60/30 peak	60	12.5	12.5
41 - Chapman Highway	60/30 peak	60	15.5	15.5
				14.0
Non-Interlined Downtown Routes				
11 - Kingston Pike	30	120	29.7	14.9
40 - South Knoxville	30	60	16.4	16.4
90A - Crosstown Loop	60	150	38.0	15.2
90B - Crosstown Loop	60	150	37.5	15.0

Routes shown in italics are operated with 20-passenger propane vans.

Changes to three interline pairs would maintain reasonable travel speeds of 13 to 14 mph for most route interlines, demonstrating the move to Knoxville Station can be accomplished with the current route structure with no associated cost increases. The proposed changes in route interlines would be as follows.

- Current interlines to be broken:
  - Routes 11 and 31
  - Routes 20 and 40
  - Routes 90A and 90B

- New proposed interlines:
  - Routes 20 and 31
  - Routes 32 and 41 (currently non-interlined routes)

It should be noted that the resulting average travel speed for the Route 30 and 42 interline pair is just below 10 mph. These are the only routes in the KAT local bus system operating at 45-minute frequencies. The analysis indicates KAT may be able to improve frequencies on these routes to 30-minutes, if desired.

4.4 Proposed Downtown Street Bus Trip Volumes

Bus service routings and the proposed new interline pairs described in Section 4.3 above were used to determine the proposed local bus volumes on downtown streets. Express route and trolley route volumes are not included. Table 4-3 identifies the highest proposed bus trips per street segment (five or more trips per hour). Figure 4-11 presents the associated weekday peak hour local bus volumes by street segment within the downtown service area.

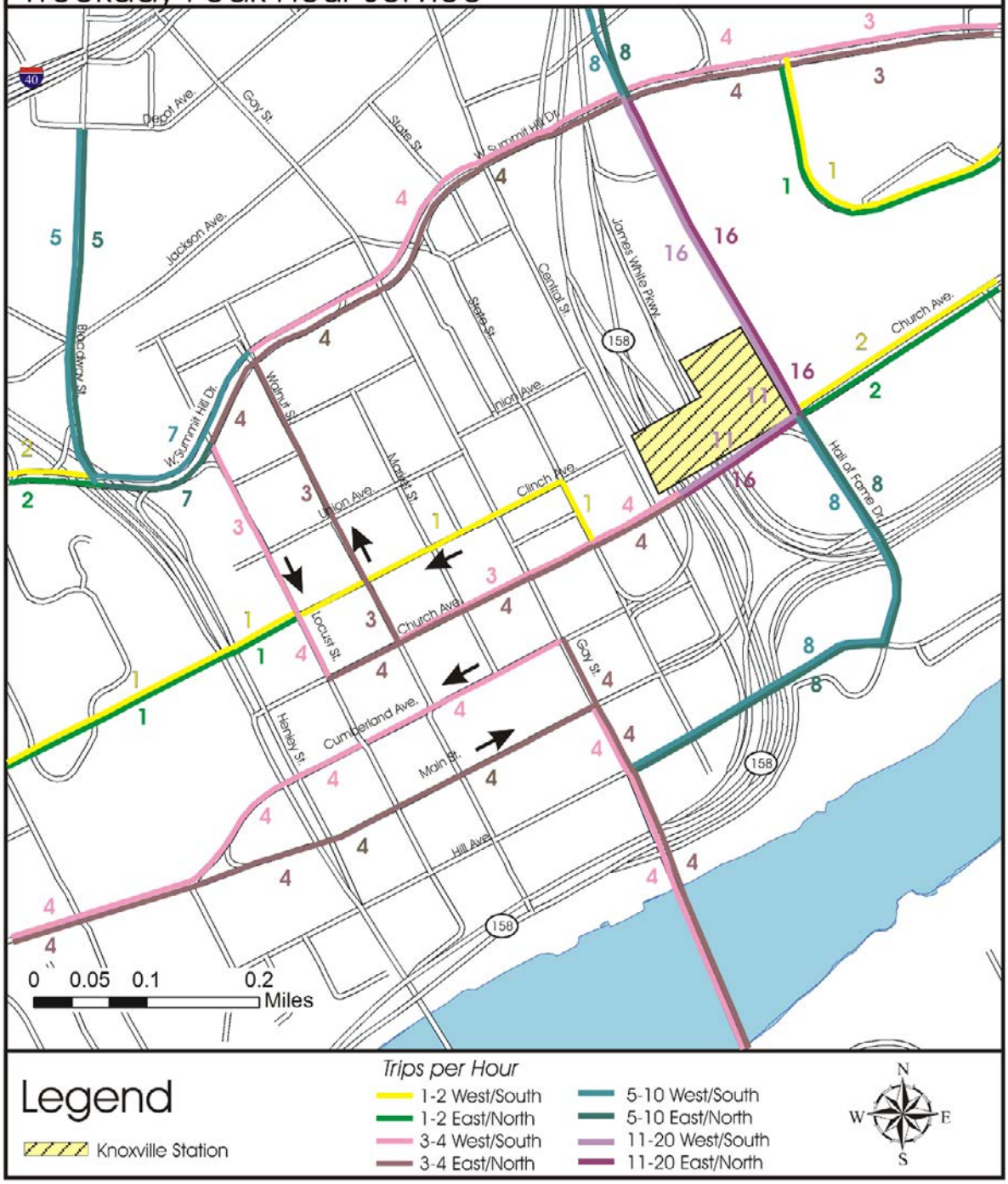
The highest volumes on any one street segment would decrease significantly to only 16 weekday peak trips per hour northbound and southbound on Hall of Fame Drive north of Knoxville Station. There would also be 16 weekday peak trips per hour exiting Knoxville Station east onto Church Avenue, due to the right-in, right-out turn restrictions at the station's Hall of Fame Drive entrance. In addition to Hall of Fame Drive, higher volume segments would shift away from the core of downtown to E. Hill Avenue and W. Summit Hill Drive.

Table 4-3
Highest Proposed Local Bus Trips/Street Segment (Five or More)

Street	From	To	Weekday Peak Trips per Hour
Church Avenue	Knoxville Station	Hall of Fame Drive	16
Hall of Fame Drive	Church Avenue	Knoxville Station	16
Hall of Fame Drive	Knoxville Station	E. Summit Hill Drive	16
Hall of Fame Drive	E. Summit Hill Drive	Knoxville Station	16
Church Avenue	Hall of Fame Drive	Knoxville Station	11
Hall of Fame Drive	Knoxville Station	Church Avenue	11
E. Hill Avenue	Gay Street	Hall of Fame Drive	8
E. Hill Avenue	Hall of Fame Drive	Gay Street	8
Hall of Fame Drive	E. Hill Avenue	Church Avenue	8
Hall of Fame Drive	E. Summit Hill Drive	Old Magnolia Avenue	8
Hall of Fame Drive	Church Avenue	E. Hill Avenue	8
Hall of Fame Drive	Old Magnolia Avenue	E. Summit Hill Drive	8
W. Summit Hill Drive	Henley Street	Locust Street	7
W. Summit Hill Drive	Locust Street	Henley Street	7
W. Summit Hill Drive	Walnut Street	Locust Street	7
Broadway Street	W. Summit Hill Drive	Depot Avenue	5
Broadway Street	Depot Avenue	W. Summit Hill Drive	5

Figure 4-11
Proposed Bus Trips by Street Segment
Weekday Peak Hour Service

Local Routes



4.5 Identification and Evaluation of Express Bus Route Access/Egress Alternatives

In addition to the local routes serving downtown, bus route access/egress alternatives were developed for the express routes serving downtown Knoxville. An initial alternative for these three routes was presented to KAT staff at the December 10, 2008 route workshop. Based on staff input, the alternative was modified as described below.

4.5.1 Initial Alternative

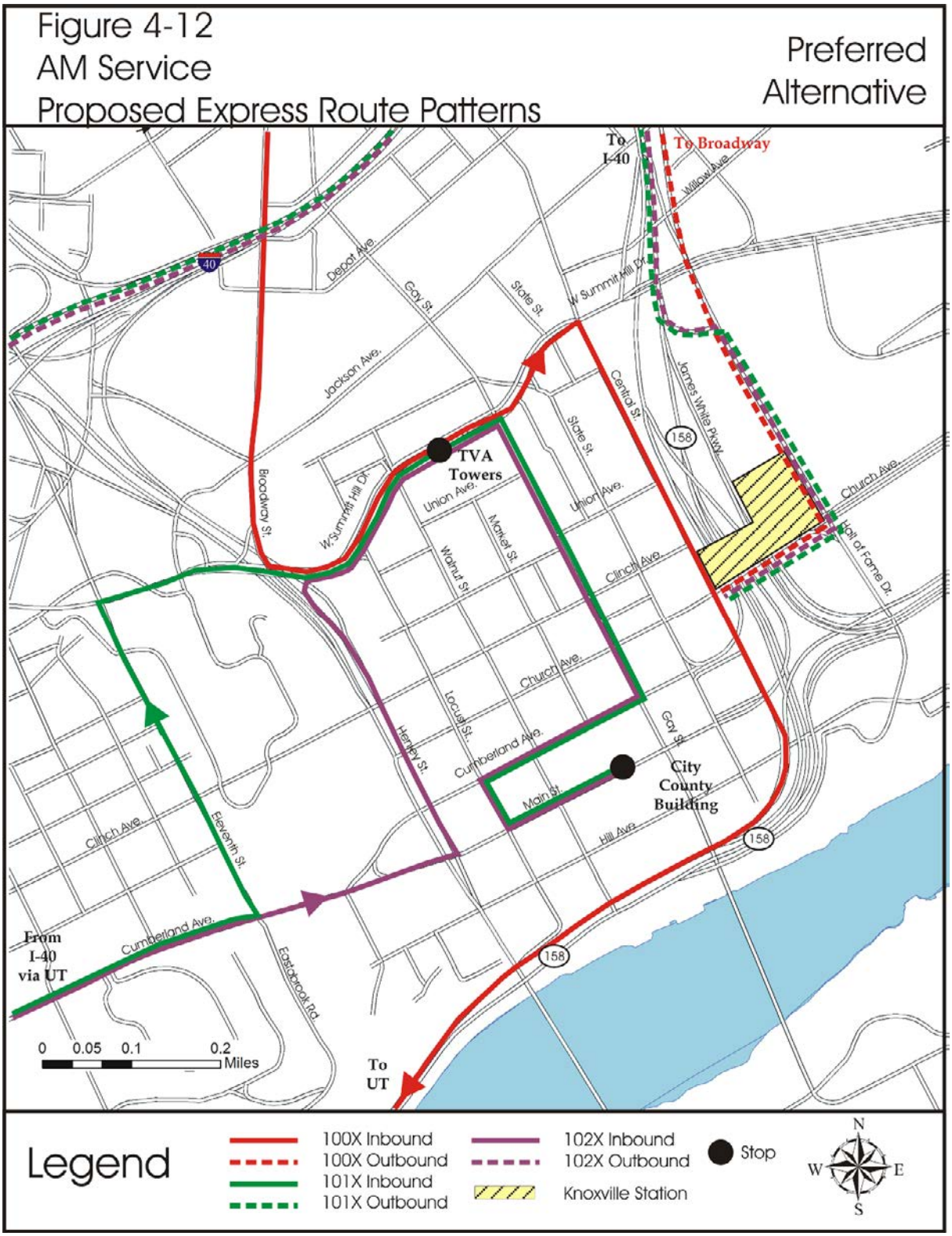
Based on the existing schedules and drivers' instructions, it was initially assumed that most express route commuters from the suburbs work either on the UT campus or at/near TVA Towers. It was unclear how important it is to serve the City County Building on Main Street as its own destination apart from the Downtown Transfer Point. Thus, the initial alternative focused on serving UT, TVA Towers, and Knoxville Station using Neyland Drive in the afternoons for quick service between UT and Knoxville Station.

4.5.2 Preferred Alternative

Staff from the City of Knoxville, KAT, and the TPO indicated that commuter service to the City County Building on Main Street is a priority. Discussions regarding serving Knoxville Station concluded that to maintain one-seat ride commuter service to both the TVA Towers/Crowne Plaza Hotel and the City County Building was important. Reverse commuter service, on the other hand, would originate from Knoxville Station for transfers from other routes. Figures 4-12 and 4-13 present the proposed morning and afternoon express route patterns in the downtown area. It should be noted that since the completion of this report, the Halls Express Route (100X) has been eliminated.

Figure 4-12
AM Service
Proposed Express Route Patterns

Preferred Alternative



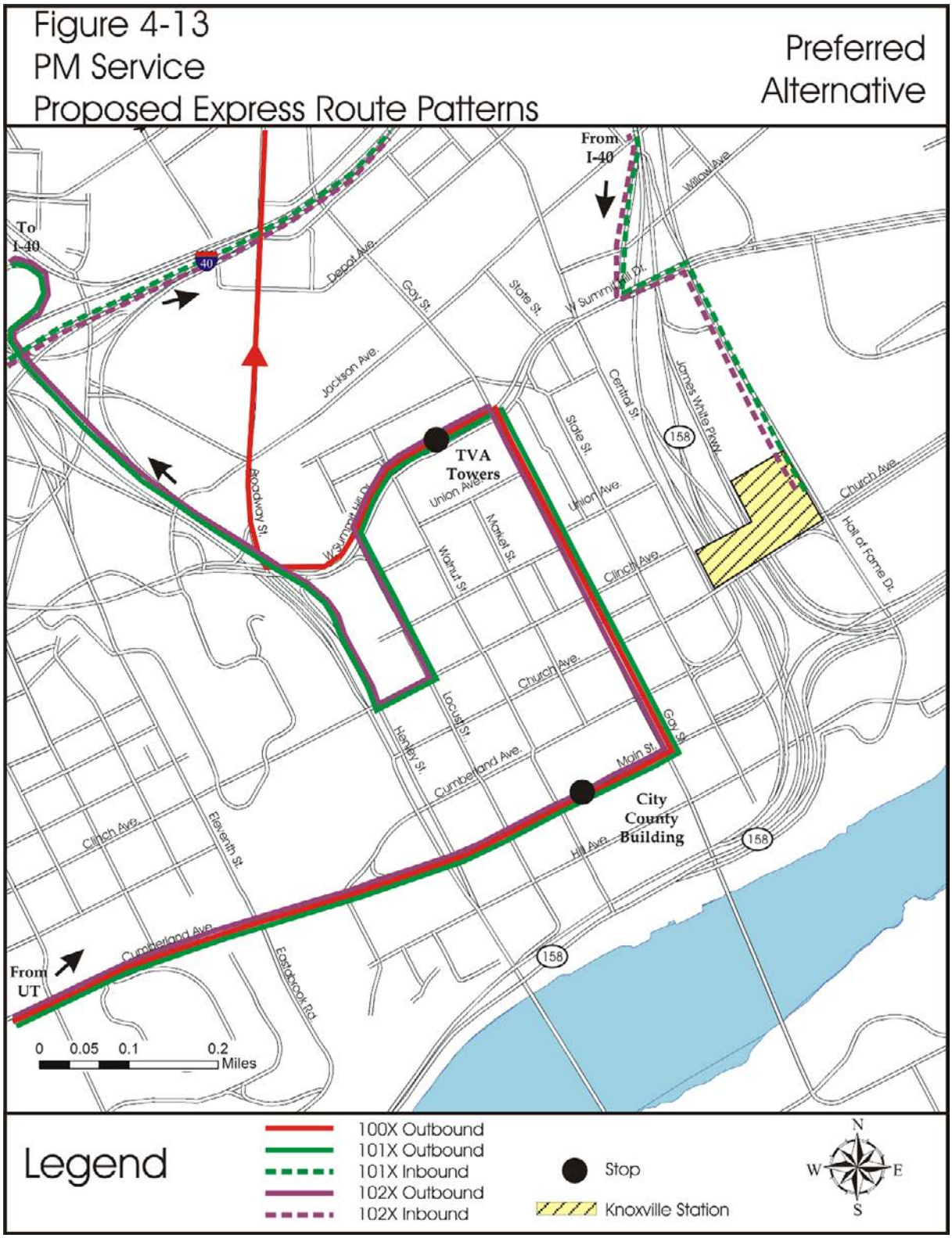


Figure 4-13
PM Service
Proposed Express Route Patterns
Preferred Alternative
From I-40
To I-40
TVA Towers
City County Building
Broadway St
Depot Ave.
Gay St.
State St.
Jackson Ave.
Union Ave.
Market St.
Walnut St.
Cinch Ave.
Church Ave.
Locust St.
Henley St.
Cumberland Ave.
Main St.
Hill Ave.
Clinch Ave.
Eleventh St.
Eastdbrook Rd
Central St
James White Pkwy
Willow Ave
Hall of Fame Dr.
158
40
From UT
0 0.05 0.1 0.2 Miles
Legend
100X Outbound
101X Outbound
101X Inbound
102X Outbound
102X Inbound
Stop
Knoxville Station
N
W
E
S

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5. Proposed Trolley Routes

This chapter presents recommendations for KAT's trolley routes. Changes to the current system are proposed to address connections to Knoxville Station, respond to findings from the ridecheck survey and public comments, and better structure the trolley routes to serve as downtown circulators.

5.1 Knoxville Station Access/Egress

As discussed in Chapter 4, a trolley stop on Church Avenue near the main entrance is part of the Knoxville Station design. Proposed trolley routes serving the station have been designed to travel westbound on Church Avenue, so that all station boardings and alightings take place at the trolley stop. Three access movements have been identified as follows:

- Westbound on Howard Baker/Church Avenue from the Civic Coliseum area;
- Northbound on Hall of Fame Drive and westbound on Church Avenue; and,
- Southbound on Hall of Fame Drive and westbound on Church Avenue.

5.2 Trolley Coverage of the Downtown Core

The downtown core has been defined in previous studies as being bounded by Interstate 40 on the north, the Civic Coliseum area on the east, the Tennessee River on the south, and Henley Street on the west. The preferred alternative discussed in the previous chapter would restructure local bus service to serve Knoxville Station and significantly reduce the level of local bus service within Knoxville's traditional downtown area. Thus, the trolleys will need to play a larger role as transit circulators in the downtown core once KAT's main transfer point moves from Main Street to Knoxville Station.

5.2.1 Transit Circulator Definition and Operational Concept

Circulator type transit services are those designed to complement the regular local bus network by featuring specialized services to smaller markets. Most circulator services are designed to connect to one or more transit centers where passengers can transfer to local transit services.

Fixed route circulators are differentiated from the regular local bus network by their configuration and purpose. The routes are generally shorter than regular bus route services and are non-linear, connecting multiple origins and destinations in the localized area and penetrating into the activity area where regular local routes often cannot physically travel. Often, smaller buses, trolleys, or vans are used to provide this degree of penetration and accessibility. Headways are frequent to ensure that the service is convenient to use, especially for midday trips among workers. Fares for these services are kept low to increase attractiveness and may be subsidized by employers or retail establishments. With short headways and running times and competitive pricing, these services are attractive alternatives to the short automobile trip with which they compete.

5.3 Proposed Trolley Routes

The current KAT trolley routings are proposed to be modified as described below and shown in Figures 5-1 and 5-2. With the exception of the Late Line Trolley and future Gay Street Trolley, these routes would serve Knoxville Station and provide for timed transfers between local routes and the trolley routes.

5.3.1 Route 80 – Blue Line Trolley

Currently, KAT's Blue Line trolley route provides for both internal circulation within the downtown core and for the distribution of downtown workers to their place of employment who either park in the Coliseum Parking Garage or transfer from a local route. It operates primarily from east to west, connecting the southern half of downtown with the attractions and parking in the Civic Coliseum area.

As Knoxville Station is in close proximity to the Civic Coliseum and parking garage, this route is proposed to be modified to operate as a simplified east-west loop serving Knoxville Station and the southern half of the traditional downtown area. It is proposed to operate from Knoxville Station west on Church Avenue and south on Gay Street to E. Hill Avenue, serving the Plaza and Riverview Towers, City County Building, and the Federal Courthouse. From that point it would turn east on Hill Avenue, north on Hall of Fame Drive, and west on Church Avenue back to Knoxville Station.

Based on the route distance, estimated average speed, and resulting cycle time, this weekday only route is proposed to operate every 7.5 minutes in the early morning and peak periods and every 15 minutes in the midday period. It would require two trolley buses in the early and peak periods and one trolley bus in the midday. To provide service in the evenings until local service ends, the Blue Line and Red Line trolleys would continue to operate every 30 minutes with one trolley bus. The total weekday span of service for the Blue Line Trolley would be from 5:45 a.m. to 12:15 a.m.

Table 5-1 presents a comparison of the existing and proposed characteristics for the Blue Line Trolley. The proposed operating plan for the route would result in a decrease in round trips, revenue-hours, revenue-miles, and vehicles required. At a cost per revenue-hour of $50.98 and an approximate savings of 2,600 in annual revenue-hours, there would be an annual operating cost savings of approximately $132,500.

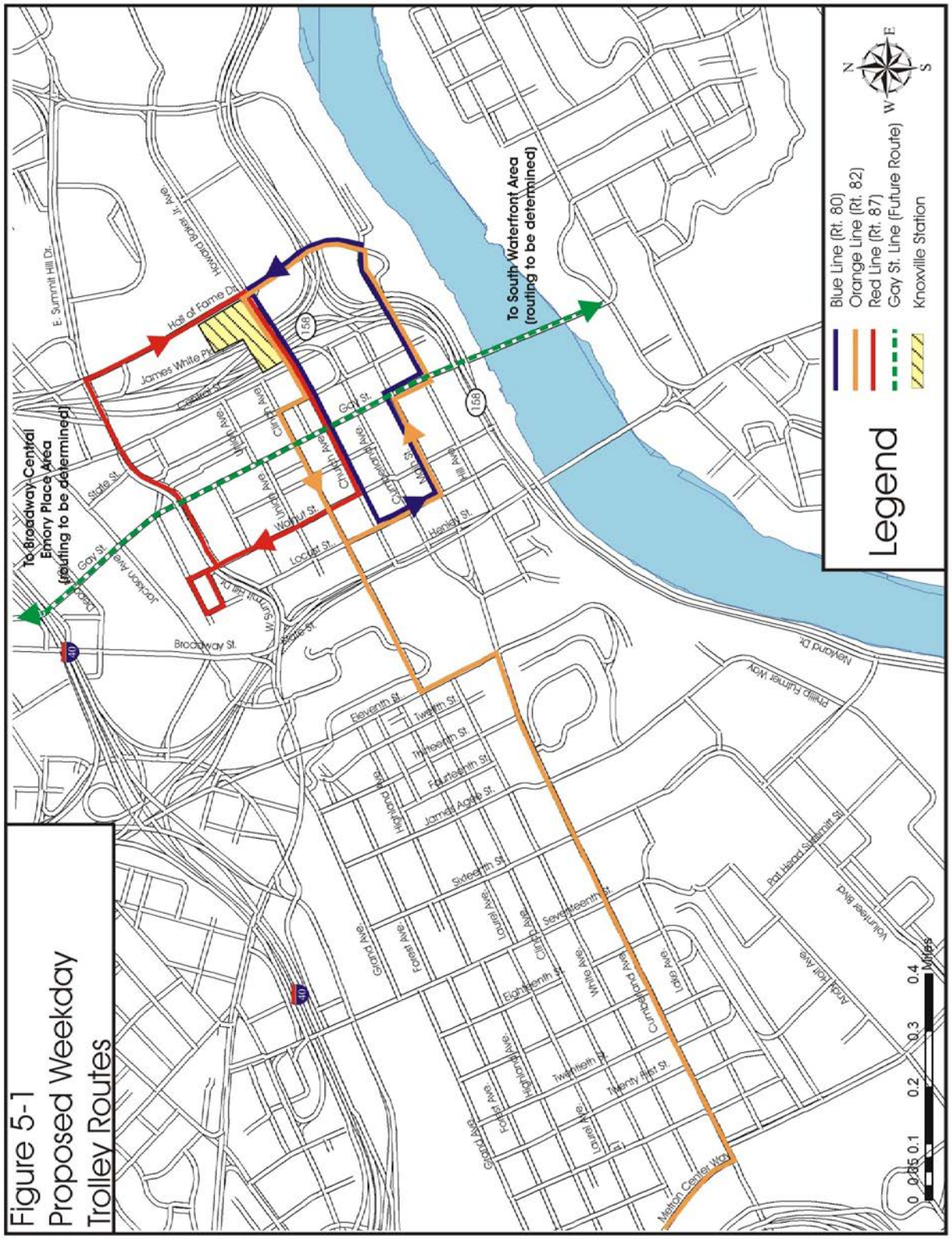

Figure 5-1
Proposed Weekday
Trolley Routes

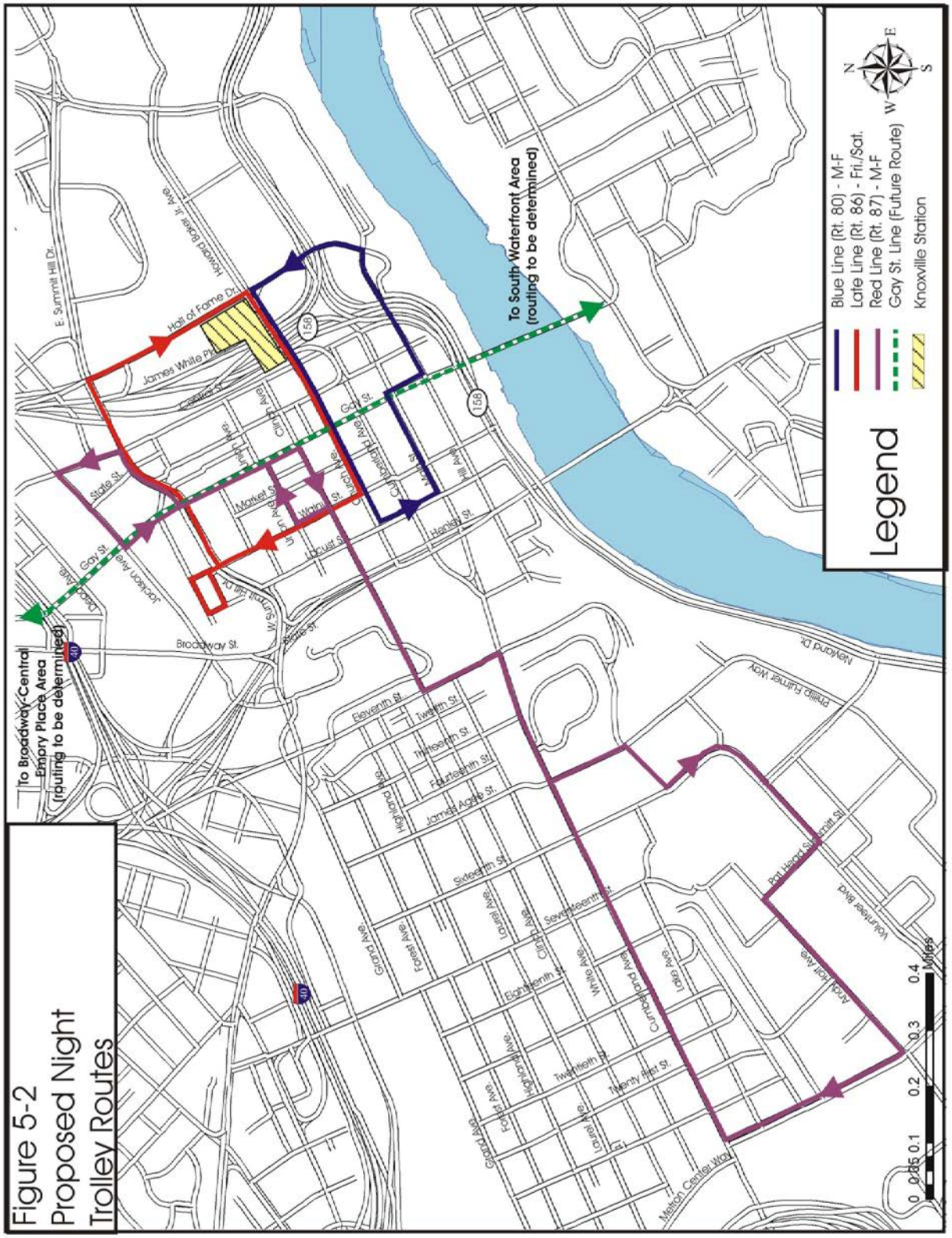

Figure 5-2
Proposed Night
Trolley Routes

Table 5-1
Route 80 – Blue Line Trolley Existing and Proposed Characteristics

	Existing	Proposed	Difference
Months Operated	Year-round	Year-round	
Days Operated	M-F	M-F	
Frequencies (Mins):			
Early Period	5	7.5	
Peak Periods	5	7.5	
Midday Period	10	15	
Evening Period	n/a	30	
Late Night Period	n/a	n/a	
Daily Round Trips	106	84	-22
Daily Rev-Hours	31.3	21.0	-10.3
Daily Rev-Miles	291.5	134.4	-157.1
Max. Vehicles (peak)	3	2	-1
Annual Rev-Hours	7,900	5,300	(2,600)
Annual Cost	$402,700	$270,200	($132,500)

5.3.2 Route 82 – Orange Line Trolley

Like the Blue Line, the Orange Line trolley provides for internal circulation and distribution of downtown workers who transfer from a local route. It also provides an important connection between downtown and UT via the Cumberland Avenue corridor. Due to the Orange Line's multi-purpose design, passengers wishing to travel from the north end of downtown (e.g., Summit Towers) to the south end of downtown (e.g., the City County Building or the Downtown Transfer Point) cannot do so without first deviating to the UT area.

This route is proposed to be modified to operate in a more direct east-west fashion between Knoxville Station and its current western terminus at Metron Center Drive. From Knoxville Station, it would operate west on Church Avenue, north on State Street, and west on Clinch Avenue. From that point, it would follow its current alignment, continuing west on Clinch Avenue, south on 11th Street, west on Cumberland Avenue, and north on Metron Center Way. After returning to downtown, it would travel south on Locust Street, east on Main Street, south on Gay Street, east on Hill Avenue, north on Hall of Fame Drive, and west on Church Avenue to complete the route at Knoxville Station. The northern half of downtown, including Summit Towers, would be served by a new trolley loop route (Route 87 – Red Line) as described below.

Based on the route distance, estimated average speed, and resulting cycle time, this weekday only route is proposed to operate every 15 minutes in the peak periods and every 7.5 minutes in the midday period. This inverse peak would reflect the observed ridership peak in the midday on this route. It would require three trolley buses in the peak periods and six trolley buses in the midday. Early morning and evening service is not proposed for this route. Evening service from the UT area

through downtown to Knoxville Station would be provided by Route 11. The total weekday span of service for the Orange Line Trolley would be from 7:15 a.m. to 6:15 p.m.

Table 5-2 presents a comparison of the existing and proposed characteristics for the Orange Line Trolley. The proposed operating plan for the route would result in a decrease in round trips and revenue-miles, but an increase in revenue-hours and vehicles required due to a longer cycle time. At a cost per revenue-hour of $50.98 and approximately 1,700 additional annual revenue-hours, there would be an annual operating cost increase of approximately $86,600.

Table 5-2
Route 82 – Orange Line Trolley Existing and Proposed Characteristics

	Existing	Proposed	Difference
Months Operated	Year-round	Year-round	
Days Operated	M-F	M-F	
Frequencies (Mins):			
Early Period	8	n/a	
Peak Periods	8	15	
Midday Period	8	7.5	
Evening Period	n/a	n/a	
Late Night Period	n/a	n/a	
Daily Round Trips	89	72	-17
Daily Rev-Hours	47.2	54.0	6.8
Daily Rev-Miles	420.0	374.4	-45.6
Max. Vehicles (midday)	4	6	2
Annual Rev-Hours	11,900	13,600	1,700
Annual Cost	$606,700	$693,300	$86,600

5.3.3 Route 84 – Green Line Trolley

The Green Line trolley does not serve the downtown core. Instead, it provides a connection between the UT campus and the off-campus apartments in the Fort Sanders area. This route is paid for by the Commons Apartments and is a poor performer.

It is proposed that the Green Line be discontinued. The North-South T-Route also serves the Fort Sanders area and comes close to several of the Commons Apartment buildings with much better frequency. Consideration should be given to attempting to negotiate the use of the subsidy from the Commons Apartments to help fund the T North-South route.

Table 5-3 presents the savings that could be achieved by eliminating the Green Line Trolley. The trolley bus currently used on this route could be redeployed to another trolley route. At a cost per revenue-hour of $50.98, the elimination of this route would result in an annual operating cost savings of approximately $91,800, but only if the Commons Apartments is willing to subsidize the T North-South route instead.

Table 5-3
Route 84 – Green Line Trolley Existing and Proposed Characteristics

	Existing	Proposed	Difference
Months Operated	Fall-Spring	n/a	
Days Operated	M-F	n/a	
Frequencies (Mins):			
Early Period	n/a	n/a	
Peak Periods	20	n/a	
Midday Period	20	n/a	
Evening Period	n/a	n/a	
Late Night Period	n/a	n/a	
Daily Round Trips	33	0	-33
Daily Rev-Hours	11	0	-11
Daily Rev-Miles	85.8	0	-85.8
Max. Vehicles (all-day)	1	0	-1
Annual Rev-Hours	1,800	0	(1,800)
Annual Cost	$91,800	$0	($91,800)

* Operates only when UT is in session (Fall & Spring)

5.3.4 Route 86 – Late Line Trolley

This trolley route connects the UT campus with nighttime attractions along Cumberland Avenue and in the downtown core. It operates on Friday and Saturday nights only from August through May. Although it performs only slightly better than the Green Line, this routes fulfills its intended function and also serves as a safe ride home for UT students on weekends. No modifications to this route are proposed. Table 5-4 presents the existing characteristics for the Late Line Trolley.

Table 5-4
Route 86 – Late Line Trolley Existing and Proposed Characteristics

	Existing	Proposed	Difference
Months Operated	Aug. - May	Aug. - May	
Days Operated	Fri - Sat	Fri - Sat	
Frequencies (Mins):			
Early Period	n/a	n/a	
Peak Periods	n/a	n/a	
Midday Period	n/a	n/a	
Evening Period	15	15	
Late Night Period	15	15	
Daily Round Trips			
Friday	39	39	0
Saturday	39	39	0
Daily Rev-Hours			
Friday	19.5	19.5	0
Saturday	19.5	19.5	0
Daily Rev-Miles			
Friday	198.9	198.9	0
Saturday	198.9	198.9	0
Max. Vehicles (evening/late)	2	2	0
Annual Rev-Hours	10,100	10,100	0
Annual Cost	$514,900	$514,900	$0

* Operates at night on Fridays & Saturdays August-May only

5.3.5 Route 87 – Red Line Trolley

This new proposed trolley route is a completely restructured version of a route operated by KAT until 2007. It is proposed to serve the northern half of downtown, operating in a loop from Knoxville Station west on Church Avenue, north on Walnut Street, to Summit Towers via the current Orange Line routing, east on Summit Hill Drive, south on Hall of Fame Drive, and completing the loop west on Church Avenue back to Knoxville Station.

Based on the route distance, estimated average speed, and resulting cycle time, this weekday only route is proposed to operate every 7.5 minutes in the early morning and peak periods and every 15 minutes in the midday period. It would require two trolley buses in the early and peak periods and one trolley bus in the midday. To provide service in the evenings until local service ends, the Red Line and Blue Line trolleys would continue to operate every 30 minutes with one trolley bus. The total weekday span of service for the Red Line Trolley would be from 5:45 a.m. to 12:15 a.m.

Table 5-5 presents the proposed characteristics for the Red Line Trolley. At a cost per revenue-hour of $50.98 and approximately 5,300 annual revenue-hours, the annual operating cost of this new route would be approximately $270,200.

Table 5-5
Route 87 – Red Line Trolley Existing and Proposed Characteristics

	Existing	Proposed	Difference
Months Operated	n/a	Year-round	
Days Operated	n/a	M-F	
Frequencies (Mins):			
Early Period	n/a	7.5	
Peak Periods	n/a	7.5	
Midday Period	n/a	15	
Evening Period	n/a	30	
Late Night Period	n/a	n/a	
Daily Round Trips	0	84	84
Daily Rev-Hours	0	21.0	21
Daily Rev-Miles	0	142.8	142.8
Max. Vehicles (peak)	0	2	2
Annual Rev-Hours	0	5,300	5,300
Annual Cost	$0	$270,200	$270,200

5.3.6 Future Gay Street Trolley Route

Figures 5-1 and 5-2 also include a potential future trolley route operating north and south along Gay Street. Such a route could serve the historic Gay Street corridor through downtown Knoxville and also provide connections with two areas targeted for redevelopment, the Broadway-Central Emory Place Area and the South Waterfront Area. The Vision Plan for the South Waterfront Area identifies public improvement projects to target in the South Waterfront during a 20 year time period, including a three mile bike and pedestrian riverwalk, parks and green spaces, new and reconstructed streets, sidewalks, bike lanes, and parking. It is anticipated that these public improvements will partner with private development, which will add new residential, commercial, retail, and recreational opportunities. These public-private partnerships are intended to benefit residents, businesses, visitors, and the City's tax base. The implementation timeframe, end-of-line alignments, frequencies, and span of service for this route would be dependent on the redevelopment efforts along the corridor. It is envisioned this route would operate on weekdays in both the daytime and evening periods.

5.3.7 Summary of Proposed Trolley Route Impacts

Table 5-6 presents a summary of the impacts on vehicles required, annual revenue-hours, and operating costs associated with the proposed trolley routes. No additional vehicles would be

required to operate the proposed routes. Eight vehicles would still be required in maximum service, although in the midday period rather than the peak periods. The net increase in revenue-hours for all trolley routes would be approximately 2,600 annually. The net increase in operating costs for all trolley routes would be approximately $132,500 (or 11 percent), before taking into account the loss in operating assistance from the Commons Apartments.

Table 5-6
Operating Impacts of Proposed Trolley Routes

	Existing	Proposed	Difference
Vehicles Required:			
Early Period	3	4	1
Peak Periods	8	7	-1
Midday Period	7	8	1
Evening Period	2	3	1
Late Night Period	2	2	0
Annual Rev-Hours	23,000	25,600	2,600
Annual Cost	$1,213,300	$1,350,500	$137,200
Percent Change			11.3%

The route recommendations within this plan are conservative as the consultant team was challenged to maintain services within the existing budget. The City of Knoxville looked at several downtown locations for the KAT transit center. The public, especially KAT riders, expressed the need for the center to be located in the core of the Central Business District. When the new location was selected, concerns were raised about whether this site met the goal of a central location. Many felt that the City of Knoxville made a commitment to offset the location with frequent trolley service and extended trolley service hours to cover the times the center will be open. In striving to meet the goal of not adding costs, the trolley service plan presented here includes only slight modifications. There may be a need to add more trolley service to accommodate the commitment of frequent and later service at Knoxville Center. This would add additional operating costs and may place more wear on the trolleys requiring the purchase of replacements sooner. Finally, the routes recommended in this report are still being evaluated by KAT staff, they are being road-tested, and they must go through an additional public involvement opportunity. Therefore, changes may occur to the recommended routes.